PRINTRONIX®

P9000 Series Multifunction Printer

User's Reference Manual

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PRINTRONIX®

P/N 133397–001, Rev B

US and CANADA Radio Interference Note

Note: This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. The manufacturer is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

The input/output (I/O) cable must be shielded for the printer to comply with FCC rules and regulations Part 15 governing the radiation limits for Class "A" equipment.

This Class A digital apparatus meets all requirements of the Canadian Interference–Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

WARNING

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Trademark Acknowledgements

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About This Manual

This manual has been written and formatted in a way to make it easy for you to use. The following is some general information about this User's Reference Manual.

What This Manual Contains

This manual is divided into chapters that contain all the information required to use the printer. Chapters provide introductory information, installation instructions, complete operating information, graphics data, Vertical Format Unit data, programming information, routine service and diagnostics procedures, interface descriptions, and appendices of supplemental information.

Warnings, Cautions, and Notes

Additional information requiring special attention is provided under the headings **WARNING, CAUTION, IMPORTANT,** and *NOTE.* WARNINGs provide information about conditions that could lead to injury; CAUTIONs provide information about conditions that could damage the printer; IMPORTANT provides information that should be stressed. *NOTEs*, printed in *italics,* provide supplemental information that could affect printer operation or use.

Switches and Indicators

Throughout this manual, switches, indicators, display messages, and possible switch settings or positions are printed in UPPERCASE TYPE. This allows you to easily identify within the text items that are located on the printer.

CHAPTER 1

OVERVIEW

Introduction

The *Printronix* P9012 printer is a quiet, full−featured, multifunction line printer. In addition to the basic *Printronix* P−Series printer functions, the P9012 includes correspondence quality print for near−letter−quality (NLQ) printing requirements, high−speed printing, and character−by−character attributes for wide application compatibility.

This chapter presents an overview of the printer:

- Features
- Optional Features
- Character Formation
- Line Matrix Printing
- Print Rate
- Plot Rate

Features

P9012 printer provides the following standard features:

- P−Series and Serial Matrix emulation protocols
- P−Series Plot and Bit Image compatible graphics
- By−Character Attributes
  - Selectable pitch
  - Emphasized print
  - Bold print
  - Expanded print
  - Automatic underline
  - Automatic overscore
  - Superscript/Subscript printing
- Selectable Forms Length
- Electronic Vertical Formatting
  - Standard *Printronix* electronic vertical format unit (EVFU)
  - Direct access vertical format unit (DVFU, NVFU, CVFU)
  - Serial Matrix compatible vertical formatting
- Resident Multinational Character Sets

- Built−in Diagnostic Self−Tests
- RibbonMinder™ Feature
- Configuration Printout
- Data Stream Hex Code Printout
- Resident Serial and Parallel Interfaces
- Downloadable Character Sets
- Downloadable Languages

Two separate graphics capabilities are included in the printer: standard P−Series odd−even dot Plot Mode graphics and Bit Image graphics. Intelligent graphics capabilities are available by using the *Printronix* Intelligent Graphics Processor (IGP) options.

Serial Matrix compatibility extends printer versatility, enabling it to be used with a wide variety of applications software. You may select industry standard *Printronix* P−Series or Serial Matrix compatibility (similar to the IBM Graphic Printer emulation) from the control panel.

The programmable Vertical Format Unit provides rapid paper advance to specified lines for printing repetitive and continuous forms. A variety of VFUs are standard in the P9012 to meet application requirements.

International languages can be selected and downloaded, and custom characters can be created. International languages and custom characters can be added to replace existing fonts stored in the Character Library and are accessible in P−Series and Serial Matrix printer protocol.

The RibbonMinder™ feature monitors ink consumption and alerts the operator when the ribbon should be changed before print quality falls below an acceptable level.

Optional Features

The P9012 printer capability and versatility can be enhanced with the options listed below. For more information, contact an authorized *Printronix* representative.

- **Intelligent Graphics Processor (IGP)** − Allows you to create and store forms, generate logos, bar codes, expanded characters, and other graphics. Forms can be created with a variety of graphic components and overlayed with alphanumeric and bar code data in a single pass. Available as a factory−installed or field−installed option.
- **Dataproducts Adapter Cable** − Accepts the 50−pin Winchester connector and connects into the 50−pin Subminiature D connector on the rear of the printer.
- **Cleaning Kit** − Provides a vacuum attachment, a cleaning brush and instructions for cleaning the print−head and shuttle area.
- **Dataproducts Long Lines Interface** − Allows the maximum cable length to be extended to 500 feet (150 meters).
- **Maintenance Manual** − Covers Theory of Operation, Cleaning, Corrective Maintenance, Troubleshooting, and Illustrated Parts Breakdown.
- **RibbonPlus**™ − Provides a full ribbon maintenance system which constantly replenishes the ink supply. Available as a factory−installed or field−installed option.

Character Formation

The P9012 printer generates characters by assembling groups of dots in matrices. Dots overlap to produce a solid appearing character (Figure 1–1). Dot impressions are made by an assembly of 88 hammers installed on an oscillating shuttle. The hammers impact the paper through a moving ink ribbon. Horizontal shuttle movement and vertical paper advancement combine for precise dot printing to form the character.

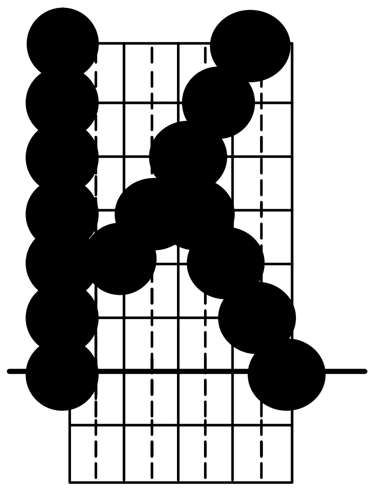


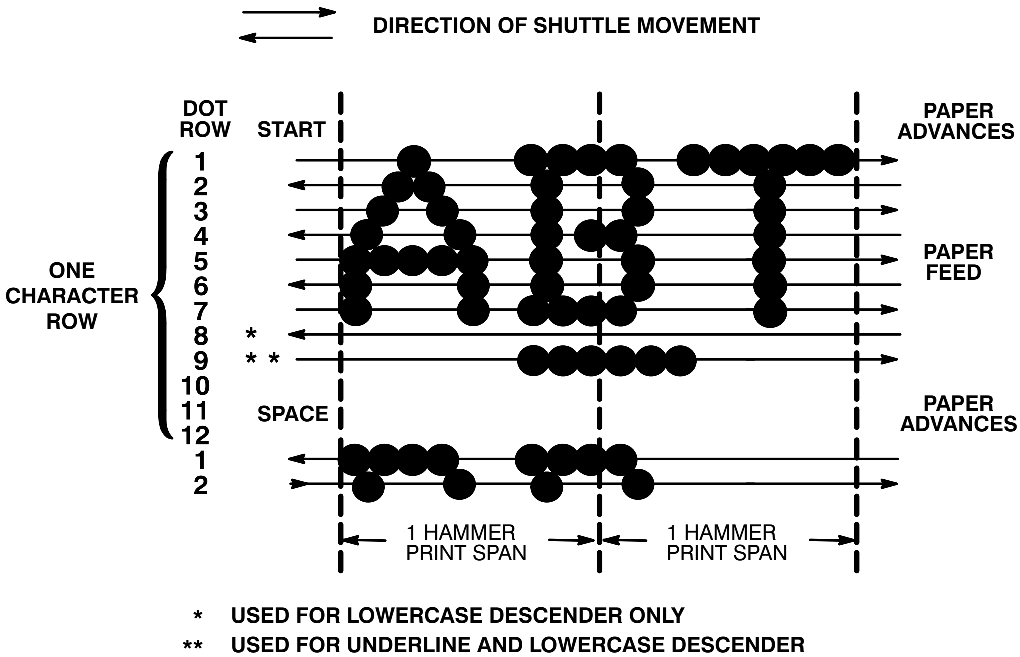
Figure 1–1. Typical Character Formation

Line Matrix Printing

Unlike moving–head serial dot matrix printers, the *Printronix* P9012 printer creates graphics and characters by printing an entire dot row at one time. Dots are printed in both directions of shuttle travel at a printer stroke length of .15” to print through 1.5 character positions in 10 pitch Data Processing print mode (Figure 1–2). By printing a row of dots, line matrix printers achieve higher print duty cycles than moving head dot matrix (serial) printers.

During each sweep of the shuttle, hammers are activated to print dots at selected positions in that dot row. When the shuttle reaches the end of a sweep, it reverses direction, paper advances one dot row, and the hammers print the next consecutive row of dots.

After an entire line of characters is printed, hammer print action ceases and the paper advances to the first dot row of the next print line. This creates a series of blank rows between lines of characters. The number of rows allowed for line separation depends on the line spacing selected.



NOTE: P9012 SHUTTLE SWEEPS THROUGH 1.5 CHARACTER POSITIONS AT 10 CPI

Figure 1−2. Line Matrix Printing

Print Rate

The print rate, in lines per minute (lpm), is a function of the number of dot rows required to produce the character line regardless of the number of characters in the line. For example, more dot rows are required to print lowercase characters with descenders; consequently, those characters are printed at a slower rate. Table 1−1 describes the print rate according to type of character printed and print mode. Complete printing specifications are provided in the Appendix.

Table 1−1. Print Rate

Print Mode	P9012 PRINT RATE (LPM) Uppercase Characters (No Descenders)	P9012 PRINT RATE (LPM) Upper & Lowercase Characters
High Speed A (HS)	1200	1030
High Speed B (HSB)	1030*	900
High Speed C (HSC)	1030*	800
Data Processing (DP)	900	720
Correspondence (NLQ)	480	370
**1030 lpm at 8 lpi; at 6 lpi, the print rate is slightly lower.*		

Plot Rate

As well as character printing, the P9012 printer is capable of dot–addressable graphic plotting. Based on the protocol selected, either P–Series Plot Mode or Serial Matrix Bit Image Graphics is used; the plot rate specifications apply to both P–Series and Serial Matrix types of graphic plotting. The plot rate (in inches per minute, "ipm," bidirectional) is described in Table 1–2 according to the dot density (in dots per inch, dpi). Complete plotting specifications are provided in the Appendix.

Table 1–2. Plot Rate

Density (dpi)	P9012 Plot Rate (ipm)
60 Horiz x 48 Vert (HS mode)	150
60 Horiz x 72 Vert (HSB mode)	100
60 Horiz x 72 Vert (HSC mode)	100
60 Horiz x 72 Vert (DP mode)	100
90 Horiz x 96 Vert (NLQ mode)	50

NOTE: Unidirectional plotting produces better print quality than bi–directional, and can be selected from the control panel; however, unidirectional plot reduces the plot rate to half.

CHAPTER 2

OPERATION

Operation Features

On Line

The P9012 printer functions either “on line” or “off line.” When on line, the printer is capable of receiving data and control commands from the host computer. The message display on the printer control panel indicates that the printer is on line and shows the current print mode.

Off Line

When the printer is off line, communication between the printer and the host computer is temporarily stopped and the message OFFLINE READY appears on the display. Set the printer off line to perform the following tasks which are described in this chapter:

- Display/Change Configuration Values
- Run the Self−Test
- Set/Advance Top−of−Form
- Enter Hex Dump Mode
- Set Line Spacing
- Set Forms Length
- Load Paper and Ribbon
- Change Print Modes
- Adjust Paper Tractors

Command Sets (Protocol Modes)

The P9012 printer responds to two different command sets, or protocols: P−Series and Serial Matrix.

The protocol is selected from the control panel and must correspond with the host programming standard to communicate with the printer. P−Series protocol generates characters and graphics using *Printronix* standard P−Series control codes. The Serial Matrix protocol generates characters and graphics using Serial Matrix control codes similar to the IBM Graphics Printer. Refer to the Programming chapter for information on P−Series and Serial Matrix protocols.

Character Set Options

Four basic character set choices are selectable from the control panel: IBM PC, Multinational, DEC Multinational, and ECMA 94 Latin 1. Within each character set, foreign language sets are also selectable. Additionally, OCR−A and OCR−B character sets are available.

You can also define and download an international language to allow any character within the character library to be substituted for any code. Similarly, an individual character in a font, or an entire set of characters, can be created and placed in a font. These downloading features are discussed in more detail in the Programming chapter and the Appendix.

Power Switch

The AC power switch is located at the lower left corner of the rear panel of the printer. To turn the printer power on, set the power switch to the ON (|) position.

❏ WARNING ❏

The power cord requires an IEC (hot) connector to mate to the receptacle on the rear panel of the printer. The hot connector includes a polarizing key which prevents the use of cordsets that are not of the correct rating for the printer.

❏ WARNUNG ❏

Das Stromkabel benötigt einen IEC (spannungsführenden) Stecker, der in die Steckdose an der hinteren Wand des Druckers passt. Der spannungsführende Stecker kommt mit einem Nulleiter, der die Benutzung von Stromkabeln ohne die korrekte Nennleistung für den Drucker verhindert.

The Control Panel

The printer control panel is illustrated in Figure 2–1. Each component of the control panel is discussed on the following pages.

Status Lamps

The status lamps are lit continuously when the printer is on line to the host and are off when the printer is off line. The lamps flash alternately if a fault condition exists in the printer.

Alphanumeric Message Display

The message display shows printer status and fault condition messages. During normal operation, the display indicates the on line status and the current print mode (and pitch) selection.

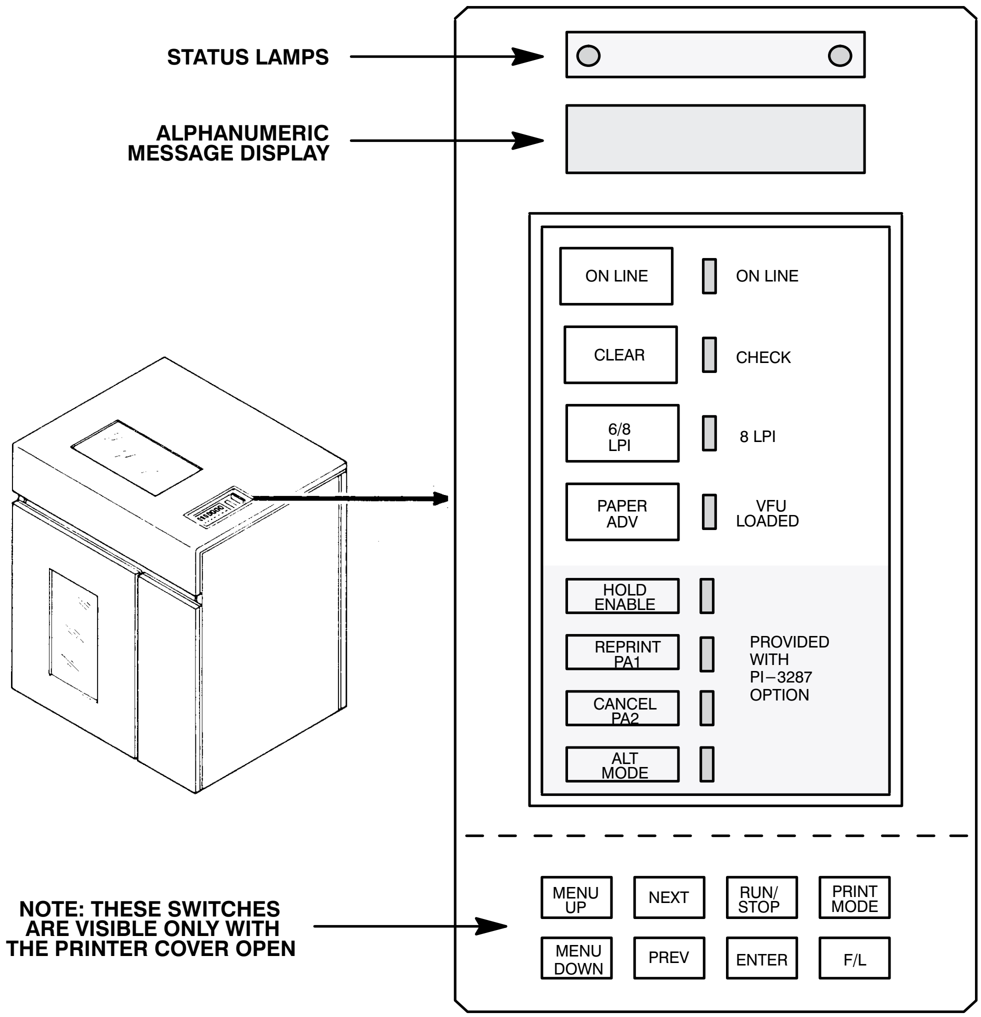


Figure 2−1. Control Panel

ON LINE Switch

Press this switch to place the printer alternately on line or off line. When the printer is on line, the ON LINE light−emitting diode (LED) next to the switch will be lit. The printer must be on line to receive data from the host computer. When the printer is on line, the display will indicate the current print mode, and only the PAPER ADV switch on the control panel will function. When the printer is off line, the display will indicate OFFLINE READY, the ON LINE LED will flash alternately, all switches are active (except the ENTER switch unless it has been unlocked), and the printer cannot communicate with the host computer. The printer must be off line to change printing format or configuration and will go off line automatically if a fault occurs.

If the display shows OFFLINE HEX DUMP (a diagnostic selection), pressing the ON LINE switch will cause the printer to go on line and data from the host computer will then be printed in “hex dump” format. The display shows ON LINE HEX DUMP. Pressing the ON LINE switch again will take the printer back to the OFFLINE HEX DUMP state.

CLEAR Switch and CHECK Indicator

If a fault condition occurs, a fault message appears on the Message Display, and the CHECK indicator flashes alternately with the ON LINE indicator. Press the CLEAR switch to indicate to the printer that a fault condition has been corrected. After pressing CLEAR, the fault status will be validated and the display updated. If all faults were corrected, the display will indicate the printer is off line.

In addition, the CLEAR switch also has the special functions noted below. Except when used to reset the printer (#1 below), the CLEAR switch operates only when the printer is off line.

1. CLEAR and RUN/STOP, pressed simultaneously, reset the printer. The printer may be reset at any time, on line, off line, or while printing. However, it is recommended that the printer be reset only when off line and no data is in the buffer, or loss of data may result.
2. CLEAR is used with the PAPER ADV switch to set top−of−form (refer to Setting Top−of−Form on page 2−9).
3. Pressing CLEAR when a configuration parameter value is displayed returns the printer to off line status. Refer to the Control Panel Configuration Diagram in the Configuration chapter.
4. Pressing CLEAR will silence the audio alarm during a fault condition.

6/8 LPI Switch

Press this switch to display the current line spacing in lines per inch (lpi). Subsequently pressing this switch steps the selection through 6, 8 and 10.3 (7/72”) lpi. Use of the ENTER switch is not required to select the line spacing. The LED next to this switch lights when line spacing is *other* than 6 lpi. The 6/8 LPI switch functions only when the printer is off line.

NOTE: Line spacing control from the host computer will override the switch setting. Control codes from the host computer can select a line spacing other than the 6, 8, or 10.3 lpi, and that selection will be reflected on the message display.

PAPER ADV Switch

With the printer on line, momentarily press PAPER ADV to advance the paper one line; or, press and hold PAPER ADV to advance to the next top−of−form. This switch can be configured to advance the paper only after printing any data remaining in the buffer, or to move paper without printing (refer to the Configuration chapter). The PAPER ADV switch is also used to set top−of−form (refer to Setting Top−of−Form on page 2−9). The PAPER ADV switch functions when the printer is on line. When the printer is on line, press the PAPER ADV switch to advance to the next top−of−form. If there is any data in the buffer, this action will not occur, and the message ON LINE DATA IN BUFFER will be momentarily displayed.

VFU LOADED Indicator

This LED indicator lights when the form (paper) format is being controlled by the Vertical Format Unit (refer to the Configuration and VFU chapters). When the appropriate VFU is selected by the operator and loaded by the host computer, this indicator will illuminate.

HOLD ENABLE, REPRINT PA1, CANCEL PA2, ALT MODE (Optional Switches)

These four switches and their associated LEDs are included on printers equipped with a *Printronix* PI−3287 printer interface and operate independently of all other control panel switches. The PI−3287 enables a *Printronix* printer to emulate an IBM 3287 printer; the printer may then be used with an IBM 3274 or 3276 control unit. Information on the operation and function of these switches is contained in the PI−3287 User's Reference Manual. If the printer is not configured to emulate an IBM 3287 printer, these switches are not provided.

THE SWITCHES DESCRIBED BELOW ARE ACCESSED BY RAISING THE PRINTER COVER:

MENU UP, MENU DOWN, NEXT, and PREV Switches

Pressing MENU UP and MENU DOWN simultaneously (from the OFFLINE READY display) will alternately lock and unlock the ENTER switch. No other switches are affected by this action. The MENU UP, MENU DOWN, NEXT, and PREV switches are also used to display configuration parameter main menus, submenus, and certain diagnostic tests. After the required menu is displayed, individual parameters are displayed using the NEXT and PREV switches as shown on the Control Panel Configuration Diagram in the Configuration chapter. The value shown on the display with an asterisk (*) is the currently active parameter value retained in printer memory.

NOTE: When the printer is off line, configuration menus and parameter values may be viewed at any time, but may only be changed by unlocking and using the ENTER switch. The ENTER switch loads a displayed value into printer working memory. The ENTER switch may only be unlocked when the printer is off line; it cannot be unlocked or locked from within a menu.

RUN/STOP

RUN/STOP performs the following functions:

- Press RUN/STOP simultaneously with CLEAR to reset the printer.
- If a diagnostic test is selected and shown on the display, press RUN/STOP to start the test and press it again to stop the test.
- If the CONFIGURATION PRINTOUT message is selected and shown on the display, press RUN/STOP to print a list of the current configuration.

ENTER

Press ENTER to enter a displayed parameter value into printer working memory. The previous value is replaced by the displayed value. The ENTER switch must be used to alter a menu selection and those parameters displayed using the PRINT MODE and F/L switches. Functions activated by the RUN/STOP and 6/8 LPI switches do not use the ENTER switch.

The ENTER switch must be enabled (unlocked) before making configuration or format changes. Simultaneously pressing MENU UP and MENU DOWN alternately locks and unlocks the ENTER switch. (This sequence protects against accidental reconfiguration.) Resetting the printer or turning the power off and on will lock the ENTER switch. No other switches are affected by this action. This action can only be done when the display shows OFFLINE, after which the display will read either ENTER SWITCH NOT LOCKED or ENTER SWITCH LOCKED for approximately one second. The display then returns to OFFLINE.

PRINT MODE

The PRINT MODE switch functions only with the printer off line. Press this switch to display the current print mode. Subsequently pressing the NEXT, PREV, or PRINT MODE switches updates the Message Display through all of the available print modes listed below. Print mode is selected with the ENTER switch.

High Speed A (HS) at 10, 12, 13.3, 15, and 17.1 cpi

High Speed B (HSB) at 10, 12, 13.3, 15, and 17.1 cpi

High Speed C (HSC) at 10, 12, 13.3, 15, and 17.1 cpi

Data Processing (DP) at 10, 12, 13.3, 15, and 17.1 cpi

Correspondence (NLQ) at 10, 12, and 15 cpi

OCR–A at 10 cpi

OCR–B at 10 cpi

NOTE: Print mode control from the host computer will override the control panel setting.

F/L (Forms Length)

The F/L switch functions only with the printer off line. Press F/L to enter the Forms Length menus. Forms length is selected with the ENTER switch.

Forms Length can be selected in inches or lines via printer configuration. Refer to Setting Forms Length on page 2–16.

Forms Length can also be set by control code from the host computer. Forms length control from the host computer will override the control panel setting. Refer to the Programming chapter for details.

Loading Paper

The P9012 printer uses standard fanfold paper from 3 to 16 inches wide and 15 to 100 lb bond (0.025 inches thick maximum). To load paper, perform the following steps and refer to Figure 2−2.

1. Place the printer off line and raise the printer cover.

2. Fully raise the Forms Thickness Adjustment Lever (A). (The CHECK indicator will light, the status lamps will flash alternately, and the display will indicate a platen open condition).

3. Open both tractor gates (B) by swinging them out.

4. Open the front printer door and align the paper supply with the position of the tractors. Feed the paper up through the paper slot (C). Push the paper up until it appears above the ribbon mask (D). If the paper snags, fold the top edge down before feeding.

5. Load the paper on the tractor sprockets (E); close the tractor gates (B). Unlock the right tractor lock (F) by raising or lowering it to the center position; slide the tractor to remove paper slack or to adjust for various paper widths. After positioning the tractor, lock it in place.

   NOTE: Lock the left tractor in alignment with the number "1" on the paper scale to set the left margin with the first character position. Once properly positioned, further adjustments are not required unless a change is made to the left print margin.

6. Press PAPER ADV to advance paper into the paper stacking area. Verify unobstructed paper feeding.

7. If necessary, use the Horizontal Adjustment Knob (G) to make fine adjustments to the left margin. The paper can be shifted left or right up to approximately 1/4 inch.

8. Set the top−of−form as described in Setting Top−of−Form (page 2−9).

9. Set the Forms Thickness Adjustment Lever (A) with slight friction to approximate the paper thickness. The A−B−C scale indicates relative positioning to correspond approximately with 1−to 6−part paper thicknesses.

   NOTE: If the Forms Thickness Adjustment Lever is set incorrectly, the print will show wavy vertical lines (known as poor phasing or light print). If set too tightly, excessive friction may cause the shuttle to smear or tear the paper, damage labels, or cause errors in form positioning.

10. Close the printer cover and door.

11. Perform the Paper Stacking instructions (page 2−11) to start the paper stacking properly.

12. Press CLEAR to update the display and place the printer on line.

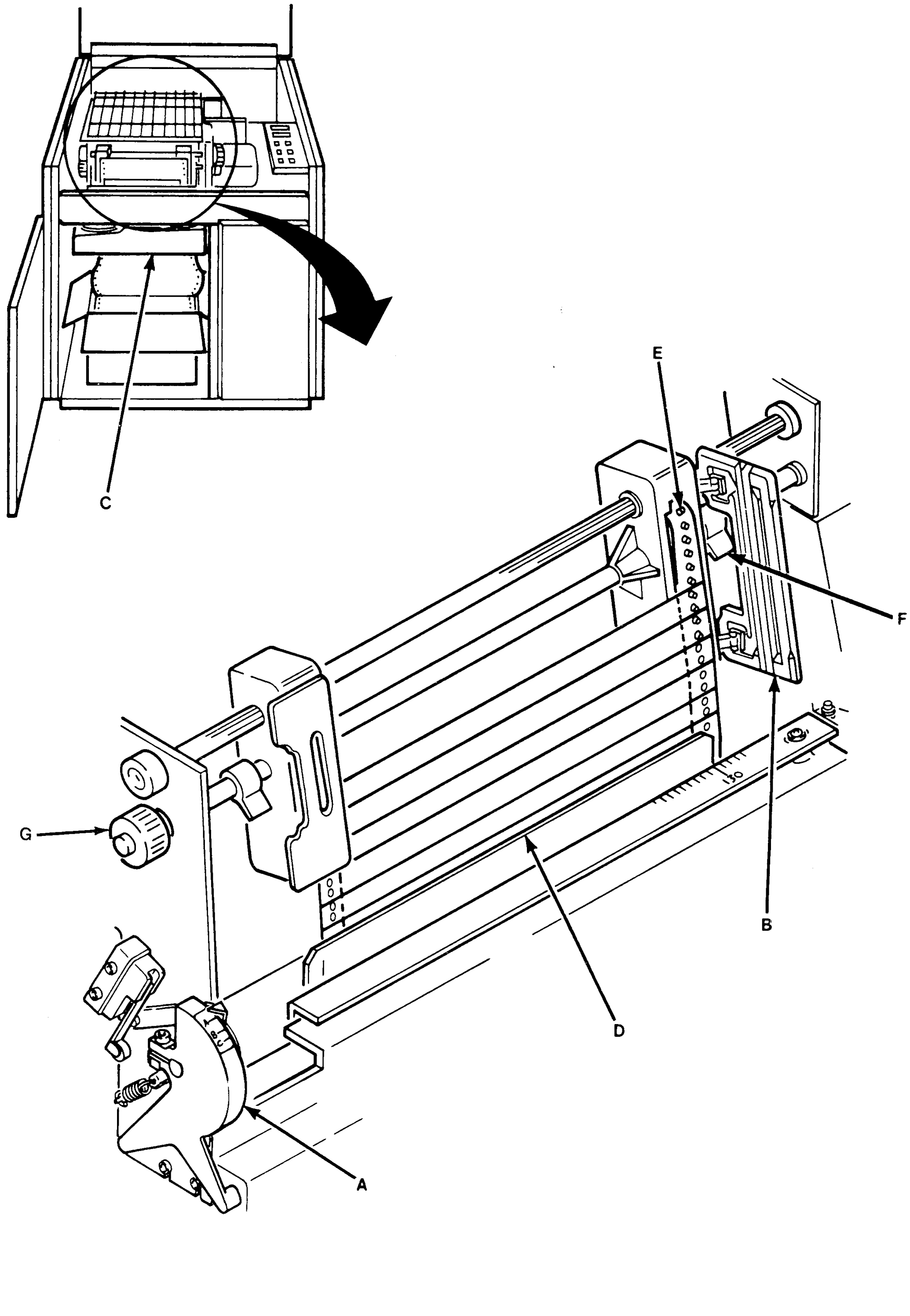


Figure 2–2. Loading Paper

Setting Top−Of−Form

Top−of−form determines where the first line of print will appear and is set when paper is loaded. Typically, the first line of print is set approximately one−half inch below the paper perforation unless specific application requirements dictate otherwise.

Once top−of−form has been set, the paper can be advanced to the top of the next form by pressing the PAPER ADV switch. Unless otherwise configured, the P9012 printer assumes 11−inch length paper is used. For alternate length forms, refer to Setting Forms Length on page 2−16.

There are two methods of setting top−of−form. The first method uses *forward* paper motion and is performed with the Forms Thickness Adjustment Lever closed. The second method uses *reverse* paper motion and is performed with the Forms Thickness Adjustment Lever open.

The reverse paper motion method should be used when the forms length setting in the printer is different from the actual form length set (for example, when the host sets the forms length for non−standard length forms). The reverse paper motion method of setting top−of−form reverse feeds the paper backward a fixed number of inches and does not use the forms length currently set in the printer.

NOTE: Do not use the reverse paper motion method of setting top−of−form for heavy forms or peel−off label forms.

Setting Top−of−Form − Forward Paper Motion

1. Place the printer off line and raise the printer cover.
2. Move the Forms Thickness Adjustment Lever to the fully open position. (The CHECK indicator will light, the status lamps will flash alternately, and FAULT CONDITION PLATEN OPEN will be displayed.)
3. Rotate the Vertical Position Knob to align the first line to be printed with the top−of−form alignment indicator on the left tractor gate (Figure 2−3).
4. Close the Forms Thickness Adjustment Lever to the appropriate paper thickness position.
5. Press and release the CLEAR and PAPER ADV switches *simultaneously.* The paper will advance to the top of form position on the next form. The display will indicate OFFLINE/ TOP OF FORM SET.
6. Close the printer cover and place the printer on line.

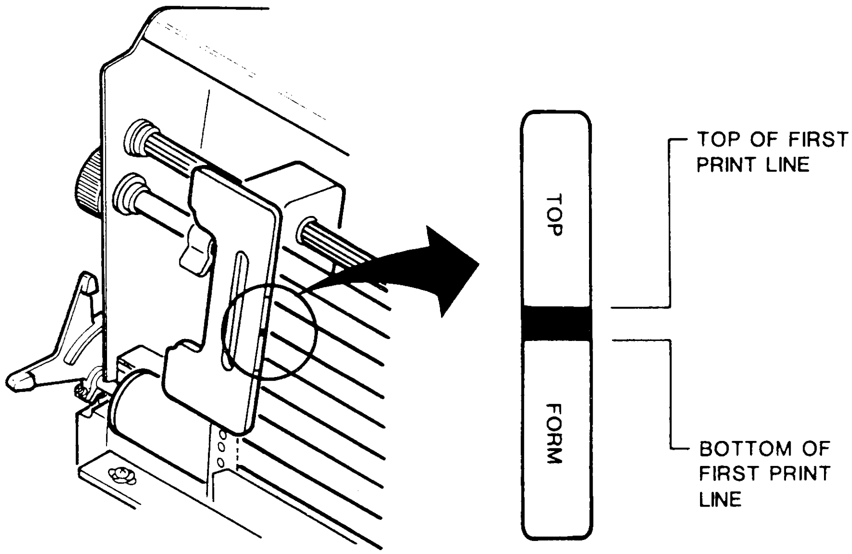


Figure 2−3. Setting Top−of−Form

Setting Top−of−Form − Reverse Paper Motion

NOTE: Do not use this method of setting top−of−form for heavy forms or peel−off label forms.

1. Place the printer off line and raise the printer cover.
2. Move the Forms Thickness Adjustment Lever to the fully open position. (The CHECK indicator will light, the status lamps will flash alternately, and FAULT CONDITION PLATEN OPEN will be displayed.)
3. Rotate the Vertical Position Knob to align the first line to be printed with the top−of−form alignment indicator on the left tractor gate (Figure 2−3).

NOTE: Be sure there is enough paper extending through the tractor area so that forms will not run out of the tractors during the reverse feed in the following step.

4. Press and release the CLEAR and PAPER ADV switches *simultaneously*. The paper will reverse feed to the top of form position on the *current* form.
5. Close the Forms Thickness Adjustment Lever to the appropriate paper thickness position.
6. Press the CLEAR switch to clear the PLATEN OPEN fault condition.
7. Close printer cover and place the printer on line.

Paper Stacking

The printer can stack at least half a box of standard computer paper when the paper is properly loaded. After loading the paper, perform the following steps.

1. Open the rear cabinet door to access the paper stacking area.

   NOTE: Step 2 pertains to installation of the front paper stacking fence. (The rear fence on the rear cabinet door is installed at the factory.) If the front fence has already been installed, continue with the paper stacking instructions at step 3.

2. Install the front paper fence in the bracket as close as possible to the paper in the stacking area with the paper close to the rear door (Figure 2–4). The bracket is located in the upper portion of the printer paper stacking area near the outer edges. The fence must be installed in the same bracket position on each side to maintain a vertical orientation.
3. Install the paper stacking tent into the paper stacking area with the far edge of the tent against the front paper fence (Figure 2–5).
4. Center the outer edges of the tent with the outer edges of the paper supply as seen through the printer cabinet.
5. Advance the paper until a few sheets begin to stack on the tent (Figure 2–6).
6. Verify the following and make any necessary adjustments.
   a. The paper stack is centered on the tent.
   b. The paper perforation folds are folding naturally.
   c. The paper is following a straight path down to the tent in alignment with the outer edges.
   d. The paper is against the front paper fence as it rests centered on the tent.
7. Run the printer and stack approximately 15 to 20 sheets of paper.
8. Repeat step 6. Any adjustments to the paper stack can be made while the printer is running. If an adjustment is made, again check the stack after approximately 15 to 20 sheets have been processed.

   NOTE: If the paper is not stacking properly, check the following items in addition to those listed in step 6.

   NOTE 1: If printing occurs across the paper perforations, the paper may not stack correctly. Adjust the Skip–Over Perforation configuration parameter to eliminate printing across the paper perforations.

   NOTE 2: If the paper path is too close to either side panel, paper stacking can be disrupted. Adjust the paper path toward the center of the printer, away from the side panels.

   NOTE 3: The front paper fence may be incorrectly positioned. Reposition the front paper fence into one of the other bracket locations.

NOTE 4: Check that the chains are properly installed (see Installation chapter) and that they engage the paper.

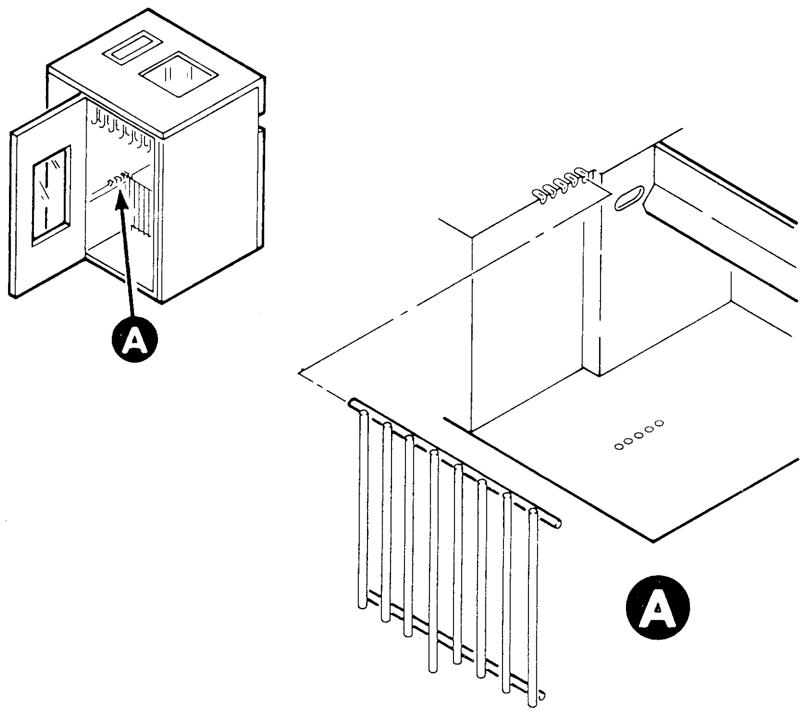


Figure 2–4. Front Paper Fence Installation

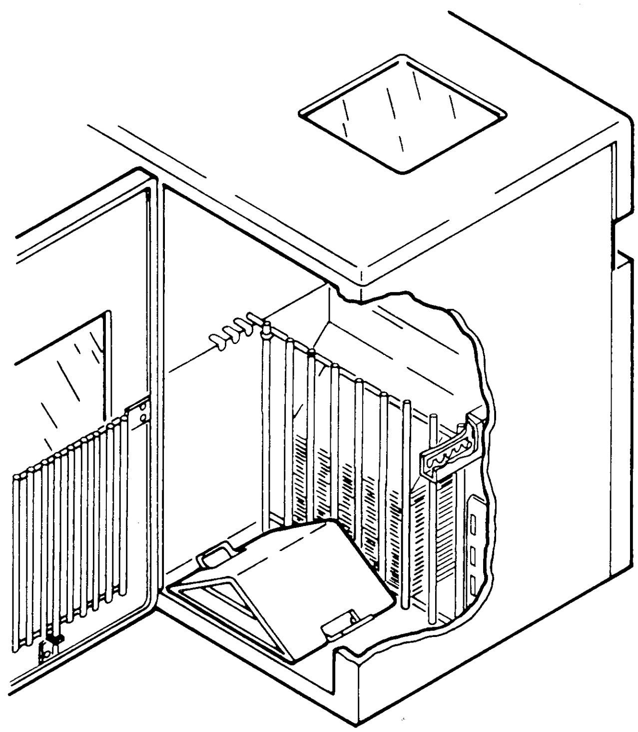


Figure 2−5. Paper Tent Installation

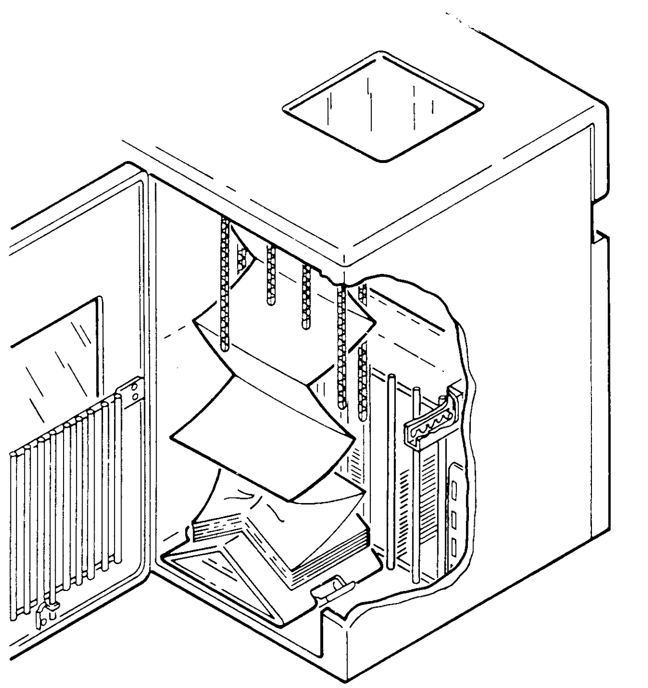


Figure 2−6. Paper Stacking

Unloading Paper

1. Place the printer off line and raise the printer cover.
2. Tear off the paper below the paper slot.
3. Fully raise the Forms Thickness Adjustment Lever.
4. Open both tractor gates and remove the paper from the tractor sprockets.
5. Gently pull the paper up through the paper slot. Be careful not to let paper perforations or sprocket holes catch on the ribbon mask.

Replacing The Ribbon

Each printer is shipped with a standard black ink, one−inch nylon fabric ribbon on two spools. OCR (extra dark) ribbons are also available. Replace the ribbon when the print contrast is too light or after each box of standard size computer paper. Use only ribbons that meet the specifications stated in Specifications, Appendix C.

NOTE: To use RibbonMinder features, refer to the RibbonMinder chapter.

To replace the ribbon, perform the following steps and refer to Figure 2−7.

1. Place the printer off line and raise the printer cover.
2. Fully raise the Forms Thickness Adjustment Lever (A) to open the platen.
3. Unlatch the ribbon spools (B) and carefully lift them off the hubs (C). Raise the ribbon out of the ribbon path. Discard the used ribbon.
4. Place each new ribbon spool (B) on a hub (C) with the ribbon to the outside. Either ribbon spool can be loaded on either hub.
5. Press the spools down until the latch (D) snaps in place.
6. Thread the ribbon around the two ribbon guides (E) and through the ribbon path as shown in the diagram (F) on the ribbon deck cover. The ribbon must pass between the two thin metallic strips called the hammer bank cover (G) and the ribbon mask (H). Manually turn the ribbon spools to ensure that the ribbon is tracking correctly in the ribbon path, and the reversal strip is between the hub and the ribbon guide.

❑ CAUTION ❑

The ribbon must not be twisted. A twisted ribbon can lower print quality, shorten ribbon life, or cause paper jams.

❑ VORSICHT ❑

Der Farbband darf nicht verdreht sein. Ein verdrehter Farbband kann die Druckqualität und die Farbbandlebensdaür erniedrigen, oder könnte Papiertransportfehler hervorrufen.

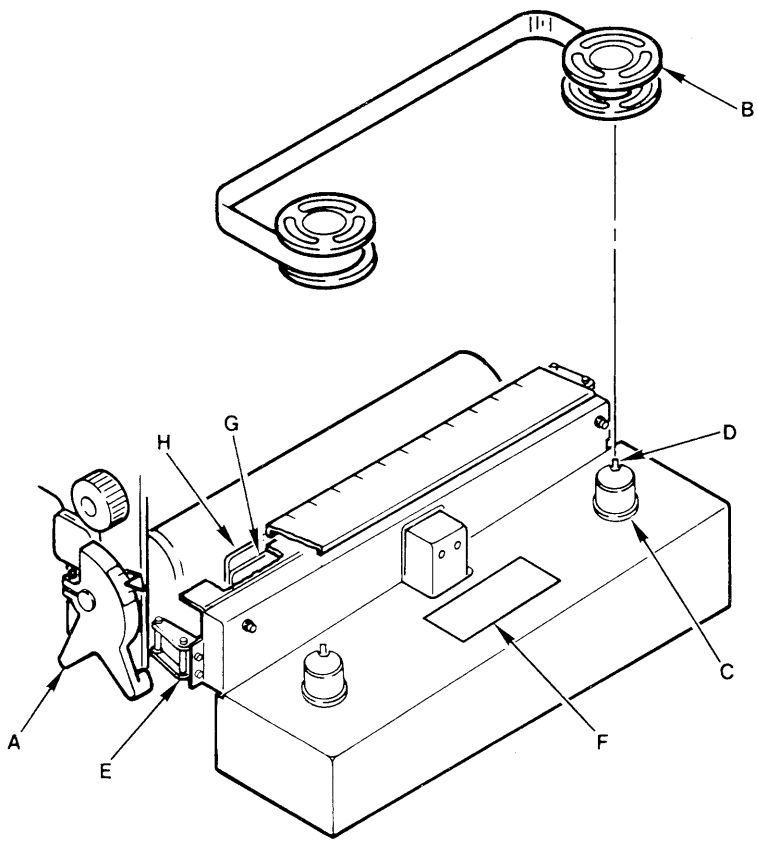


Figure 2−7. Ribbon Replacement

7. Lower the Forms Thickness Adjustment Lever (A) to the appropriate operating position.

8. Press CLEAR (on the control panel) to clear the PLATEN OPEN fault condition.

9. Close the printer cover and place the printer on line.

Setting Forms Length

NOTE: Forms length can also be set by control code from the host computer which will override the control panel setting. Using control codes, the host computer can specify forms lengths other than those available from the control panel. Refer to the Programming chapter for more information.

The printer uses continuous, tractor–fed paper with the forms length set between 1.0 and 24.0 *inches*, or between 1 and 192 *lines* at 6 or 8 lines per inch. Setting the forms length in lines at 6 or 8 lpi does not change the line spacing.

The printer has been preset for 11–inch length paper. When using paper of a different length, the top–of–form setting and the forms length setting must be changed to match the designated length. To set the forms length:

1. Place the printer off line and raise the printer cover.
2. Simultaneously press MENU UP and MENU DOWN to unlock the printer configuration. ENTER SWITCH NOT LOCKED will be displayed briefly.
3. Press F/L; the display will show FORMS LENGTH SET IN INCHES.
4. Press NEXT or PREV to cycle through the following options: FORMS LENGTH SET IN 6 LPI LINES, FORMS LENGTH SET IN 8 LPI LINES, and FORMS LENGTH SET IN INCHES. Select an option, and perform the corresponding instructions below.

To Set Forms Length in Inches

1. Press NEXT or PREV until FORMS LENGTH SET IN INCHES is displayed.
2. Press MENU DOWN or F/L to display the current forms length in inches.
3. Press NEXT or F/L to increase the forms length in 0.5–inch increments, or press PREV to decrease the forms length in 0.5–inch increments. When the appropriate value is displayed, save it as described below.
4. Press ENTER to select the displayed forms length.
5. Press CLEAR to return to OFFLINE READY.
6. Simultaneously press MENU UP and MENU DOWN to lock the printer configuration.
7. Set the top of form according the the instructions on page 2–9.
8. Close printer cover and place the printer on line.

To Set Forms Length in Lines

1. Press NEXT or PREV until FORMS LENGTH SET IN 6 LPI LINES or FORMS LENGTH SET IN 8 LPI LINES is displayed.

2. Press MENU DOWN to display the current forms length in lines.
3. Press NEXT or PREV to increase or decrease the forms length in 1−line increments, respectively. When the appropriate value is displayed, save it as described below.
4. Press ENTER to select the displayed forms length.
5. Press CLEAR to return to OFFLINE READY.
6. Simultaneously press MENU UP and MENU DOWN to lock the printer configuration.
7. Set the top of form according the the instructions on page 2−9.
8. Close printer cover and place the printer on line.

Selecting Print Mode

During normal operation, the message display indicates the printer is on line and what print mode is currently selected; for example:

ON LINE
DP AT 10 CPI

1. Place the printer off line and raise the printer cover.
2. Simultaneously press MENU UP and MENU DOWN. ENTER SWITCH NOT LOCKED will be displayed briefly.
3. Press PRINT MODE; the currently selected print mode will be displayed.
4. Press NEXT, PREV, or PRINT MODE to cycle through the various print mode options. The following print mode options are available:

   Data Processing (DP) at 10, 12, 13.3, 15, and 17.1 cpi

   Correspondence (NLQ) at 10, 12 and 15 cpi

   High Speed A (HS) at 10, 12, 13.3, 15, and 17.1 cpi

   High Speed B (HSB) at 10, 12, 13.3, 15 and 17.1 cpi

   High Speed C (HSC) at 10, 12, 13.3, 15 and 17.1 cpi

   OCR−A and OCR−B at 10 cpi

   NOTE: The control panel actually displays 13 or 17 cpi when 13.3 or 17.1 cpi, respectively, is selected.

5. When the desired print mode is shown on the display, press the ENTER switch.
6. Press CLEAR to return the printer to off line status. The display will read OFFLINE READY.
7. Simultaneously press MENU UP and MENU DOWN to lock the printer configuration.
8. Close printer cover and place the printer on line.

For additional printing capabilities and character attributes, refer to the Programming chapter. Print mode control from the host will override the control panel setting.

Setting Line Spacing

P9012 printers can be set for a line spacing of 6, 8, or 10.3 lines per inch (lpi) from the control panel by using the 6/8 LPI switch. To select the line spacing from the control panel, perform the following procedure.

1. Place the printer off line.
2. Press 6/8 LPI; the currently selected lpi setting will be displayed.
3. Press NEXT, PREV, or 6/8 LPI to step through the 6, 8, and 10.3 lines per inch selections. The light beside the 6/8 LPI switch lights when the selected line spacing is other than 6 lpi.
4. Press CLEAR when the desired line spacing setting is displayed; the printer will be placed off line and the display will read OFFLINE READY.
5. Place the printer on line.

Line spacing can also be selected by sending line spacing control codes from the host computer as described in the Programming chapter. Using control codes, the host computer can specify line spacing other than 6, 8, or 10.3 lpi. Line spacing control from the host computer will override the control panel setting.

Printer Reset

This procedure resets the printer to the configuration values *last saved* (not factory default values), and the current form position becomes the top−of−form. The printer can be reset to the power−up configuration values at any time: on line, off line, or while printing. However, it is recommended that the printer be reset only when off line to prevent the possible loss of data.

To reset the printer, press CLEAR and RUN/STOP simultaneously.

Hex Code Printout

The hex code printout (often called a “hex dump”) are useful for debugging when troubleshooting printer data reception problems. Hex dumps list ASCII character data received from the host with the corresponding two−digit hexadecimal code. Printable characters print their assigned symbol; nonprintable characters are indicated with a period symbol. A “p” before the hex code indicates an active Paper Instruction (PI) line; a blank space before the hex code indicates an inactive PI line. To print the data stream received from the host computer in hex code with ASCII character equivalents, perform the following steps.

1. Place the printer off line and raise the printer cover.
2. Press MENU DOWN; repeatedly press NEXT or PREV until DIAGNOSTICS is displayed.

3. Press MENU DOWN, then repeatedly press NEXT or PREV until the PRINT DATA STREAM IN HEX CODE message is displayed.

4. Press MENU DOWN; the display will show OFFLINE HEX DUMP.

5. Press ON LINE. The display will indicate that the printer is on line and in hex dump mode.

6. Send the data from the host; the hex dump will print.

7. Press ON LINE again to stop the hex dump. The display will read OFFLINE HEX DUMP.

8. Press CLEAR to return printer to OFFLINE READY.

9. Close the printer cover and place the printer on line.

NOTE: Any data remaining in the buffer will be printed before the hex code printout starts.

Running the Self−Test

P9012 printers include various self−test functions. Use the self−test as needed to determine if the printer is functioning normally.

To run the self−tests:

1. Place the printer off line and raise the printer cover.

2. Press MENU DOWN; repeatedly press NEXT or PREV until DIAGNOSTICS is displayed.

3. Press MENU DOWN, then repeatedly press NEXT or PREV until either PRINTER TEST FULL WIDTH or PRINTER TEST 8 INCH WIDTH message is displayed.

4. To select one of the 8 INCH WIDTH or FULL WIDTH paper tests, press MENU DOWN then repeatedly press NEXT or PREV until the appropriate test is displayed. Tests include shift recycle, all Es, and others.

5. Press RUN/STOP to begin the selected self−test; press RUN/STOP again to stop it.

   NOTE: Any data remaining in the buffer will be printed before the self−test begins.

Examine the print quality. The characters should be horizontally and vertically aligned and correctly formed. If print quality problems exist, contact your authorized service representative.

6. Press CLEAR to place the printer off line. The display will read OFFLINE READY.

7. Close the printer cover and place the printer on line.

Fault Condition Messages

If a fault condition occurs in the printer, the CHECK light illuminates, the status lamps blink alternately, and the first line of the message display reads FAULT CONDITION. If configured, an alarm will sound when the Fault Condition occurs. The second line of the display will show the specific fault. (If the specific fault description requires two lines, the message FAULT CONDITION will not be shown.) Displayed faults fall into one of two categories:

- Operator correctable faults
- Field service required

NOTE: The alarm can be turned off before the fault is cleared by pressing the CLEAR switch.

Operator Correctable Faults

Printer problems that the operator can correct are self−explanatory and appear on the second line of the display:

PAPER OUT	SHUTTLE STALL
PLATEN OPEN	COVER OPEN
PAPER JAM	COOLING
CHANGE RIBBON	

After correcting an operator correctable fault, press the CLEAR switch before placing the printer on line. If any other fault messages appear *without* an asterisk (*), press the CLEAR switch to continue. However, if this problem persists, contact your authorized service representative to correct the problem permanently.

❑ IMPORTANT ❑

If NVM INITIALIZED PRESS CLEAR appears on the display every time the printer power is cycled, non−volatile memory must be replaced. Non−volatile memory can be temporarily bypassed by pressing the CLEAR switch. However, no configuration data may be saved, and the factory default is loaded. Contact your authorized service representative to correct the fault permanently.

Field Service Required

Printer problems requiring the attention of an authorized service representative also appear on the second line of the display and are indicated by an asterisk (*) next to the message:

PROGRAM PROM *

NOVRAM *

FONT PROM *

HAMMER DR PCB X * (X = 1, 2, or 3)

If HAMMER DR PCB X * appears on the display, printer power will automatically shut off 10 seconds after the fault message is displayed.

If, upon printer power−up, the lamps and/or LEDs flash and no message is provided in the display, contact your authorized service representative to correct the fault permanently.

CHAPTER 3

CONFIGURATION

Introduction

Configuration refers to the set of operating parameters that define how the printer communicates with the host computer. Most configuration parameters are selected from the control panel, as shown in the Control Panel Configuration Diagram at the end of this chapter. Some configuration parameters are hardware selectable by installing jumpers on the DCU board, as described in Appendix F. Such hardware configuration changes do not normally require changes to the factory settings.

Read this chapter before configuring *any* printer function. The following information is presented:

- Lock/Unlock Printer Configuration
- Configuration Menus
- Configuration Printout
- Factory Default Configuration Values
- Configuration Procedure
- Load Configuration Values
- Control Panel Configuration Diagram

Lock/Unlock Printer Configuration

The ENTER switch must be unlocked to reconfigure the printer from the control panel. At powerup, the printer configuration is locked to prevent accidental reconfiguration. In order to change any configuration value, the ENTER switch must be unlocked. Pressing MENU UP and MENU DOWN *simultaneously* (while the printer is off line) will alternately unlock and lock the ENTER switch. The message display will briefly read ENTER SWITCH NOT LOCKED or ENTER SWITCH LOCKED when the printer configuration is unlocked or locked, respectively. While in the configuration menus, pressing the ENTER switch will enter a selected value into printer configuration.

Configuration Menus

With the printer off line, pressing MENU DOWN, then repeatedly pressing NEXT or PREV displays the main configuration menus. The individual parameter values or secondary menus are displayed by again pressing MENU DOWN. All parameter options within a menu may be viewed by pressing NEXT and PREV. Pressing MENU UP will step the configuration menu back up one level.

From the main configuration menus below, related configuration parameter values can be displayed and selected.

- Ribbon Life xxx%
- Character Set
- Application Compatibility
- Paper Format
- Host Interface
- Load Parameters
- Save Parameters
- Diagnostics

NOTE: The xxx% in the Ribbon Life menu will not be displayed in the LCD message if the RibbonMinder feature is disabled.

Once the ENTER switch is unlocked, selected values can be saved as the current configuration by displaying the value in the LCD and pressing ENTER. You can exit from a configuration menu by pressing CLEAR which will place the printer off line.

NOTE: If an "E" is displayed in the upper right corner of the LCD, the VFU is enabled. If an "L" is displayed in the lower right corner of the LCD, the VFU is loaded.

Configuration Printout

The configuration printout lists all of the currently selected configuration parameter values. Figure 3−1 is a sample configuration printout. Configuration parameters on the printout are listed in the same order as the configuration menu via control panel.

The following general procedure can be used to obtain a configuration printout. Refer to the Control Panel Configuration Diagrams beginning on page 3−11 for an illustration of the buttons required to select and display the menus and values. When this mode is exited, the previous print mode and LPI is restored, and all print attributes are canceled. All other format parameters are unaffected.

1. Place the printer off line and raise the printer cover.
2. Select and display the CONFIGURATION PRINTOUT menu in the DIAGNOSTICS menu by pressing MENU DOWN and then PREV until DIAGNOSTICS appears in the message display.
3. Press MENU DOWN to display CONFIGURATION PRINTOUT in the message display.
4. Press RUN/STOP. The configuration printout will print.
5. Press CLEAR to return to OFFLINE READY.
6. Close the printer cover and place the printer on line.

```
Copyright 1990, PRINTRONIX Inc.
MODEL P9012
P9000 DCU Version 3.00E, 11-Jun-1990 Part No. 134151
P9000 MCU Version 2.06B, 28-May-1990 Part No. 134145
P9000 FNT Version 3.00D, 11-Jun-1990 Part No. 134152

    Print Statistics
        Power-on Time           55470.6 Hrs
        Print Time              45568.8 Hrs
        Shuttle Strokes         0050530042
        Print Lines             0000196922
        Print Pages             0000000000

    Configuration
        Form Length Set         at 11.0 Inches
        Line Spacing            Set at 6 LPI
        Print Mode              DP AT 10 CPI

    Ribbon Life
        Job Rate                Current      150
        Ribbon Size             Current       60
        When Worn Action        Stop Printer
        Enable/Disable          Disable Action

    Character Set
        Select Set              IBM PC
        Select Subset           IBM PC GRAPHICS
        Select Language         ASCII

    Application Compatibility
        Printer Protocol        P-Series
        Buffer Size             2048 Characters
        Paper Advance SW        Print + Pap Adv
        Power On State          On Line
        Alarm On Fault          Enable
        Shuttle Timeout         4 Seconds
        Unidirectional          Disable
        Select SFCC             01 SOH
        80-9F Hex.              Control Codes
        Control Code 06         8.0 LPI
        Control Code 08         Double High
        Overstrike              Enable
        Display Language        English

    Paper Format
        Auto Line Feed          After Full Line
        Define CR Code          CR = CR
        VFU Select              EVFU
        Perforation Skip        Disable
        Paper Out               End of Paper
        PMD Fault               Enable
        Print Width             13.2 Inches

    Host Interface              Centronics
        Data Bit 8              Enable
        PI Line                 Disable
        Data Polarity           Standard
        Resp. Polarity          Standard
        Fast Busy               Enable
        Strobe Polarity         Standard
        Latch Data On           Leading Edge
```

Figure 3–1. Sample Configuration Printout

Factory Default Configuration Values

Printronix factory default configuration values are shown in Table 3–1. These values are operational when the printer is received. New values can be saved and applied as necessary for each application, but factory default values remain accessible using the LOAD PARAMETERS menu. On the Control Panel Configuration Diagrams, factory configuration values are indicated by an asterisk (*). (The asterisk is not shown on the printer display.)

Table 3–1. Printronix Factory Default Configuration Values

Configuration Parameter	Factory Default Value	Configuration Parameter	Factory Default Value
Forms Length	11.0 Inches	Perforation Skip	Disable
Line Spacing	6 lpi	Paper Out	End of Paper
Print Mode	DP 10 cpi	PMD Fault	Enable
Select Set	IBM PC	Line Width	13.2 Inches
Select Subset	IBM PC Graphics	Host Interface	Centronics
Select Language	ASCII	Parallel Interface:	
Ribbon Life	100	Data Bit 8	Enable
Ribbon Size	60	PI Line (Dataproducts)	Enable
Job Rate	150	PI Line (Centronics)	Disable
When Worn Action	Stop Printer	Data Polarity	Standard
Printer Action	Disable	Resp. Polarity	Standard
Printer Protocol	P–Series	Latch Data On	Leading Edge
Buffer Size	2048 Characters	Fast Busy (Centronics)	Enable
Printer Select	Disable	Strobe Polarity	Standard
Paper Advance Switch	Print & Paper Advance		
Power On State	Online	Serial RS–232 Interface:	
Alarm On Fault	Enable	Data Protocol	X–On / X–Off
Shuttle Timeout	4 Seconds	Data Rate	9600 Baud
Unidirectional	Disable	Word Length	8 Bits
Select SFCC	01 SOH	Stop Bits	One
80–9F Hex	Control Codes	Parity	None
Control Code 08	Double High	Bit 8 Function	Font Select
Control Code 06	8 LPI	CD and DSR	Disable
Overstrike	Enable	CTS and DSR	Disable
Display Language	English	Data Term Ready	Online and BNF
Auto Line Feed	After Full Line	Request to Send	Online and BNF
Define CR Code	CR = CR	Reverse Channel	Online and BNF
VFU Select	EVFU		

Configuration Procedure

Most configuration options are selected from the control panel menu. To change the configuration from the control panel, the printer must be powered up, off line (OFFLINE READY), and the control panel ENTER switch enabled (unlocked). The current configuration may be examined − but not changed − by leaving the ENTER switch locked.

The basic configuration procedure requires pressing MENU DOWN and NEXT/PREV to arrive at the desired menu. The parameters associated with that menu are accessed by pressing MENU DOWN again, at which time the currently active parameter or a submenu is displayed. NEXT and PREV are used to sequentially list all the parameters or submenus available within that menu. When the currently active value is shown on the display, it will be indicated with an asterisk (*) next to it. Pressing ENTER selects the parameter visible on the display, and replaces the previous parameter. The Control Panel Configuration Diagram, which illustrates all configuration menus and values, is provided at the end of this chapter. Thoroughly review these diagrams to understand the configuration menu hierarchy and the control panel buttons to select individual menus and parameter values.

The following general procedure can be used to reconfigure the printer from the control panel:

1. Obtain a current configuration printout as described in the Configuration Printout section of this chapter.
2. Determine the parameter values that must be changed to meet your requirements. Refer to the Control Panel Configuration Diagram for an illustration of the parameter values and the procedure required to select and display the values.
3. Place the printer off line and raise the printer cover. Enable the ENTER switch by pressing MENU UP and MENU DOWN simultaneously until the ENTER SWITCH NOT LOCKED message appears briefly in the LCD message display.
4. Select and display the desired menu by pressing MENU DOWN and then NEXT or PREV until the name of the menu appears in the LCD message display.
5. Select and display the required value(s) for the selected menu item by pressing MENU DOWN and then NEXT or PREV until the value appears in the LCD message display.
6. Save the selected value(s) by pressing ENTER.
7. After all parameters have been changed as required, select SAVE PARAMETERS from Level II of the main menu and press ENTER. This will save the current parameter values as the powerup values.
8. Press CLEAR to place the printer off line. Disable the ENTER switch by pressing MENU UP and MENU DOWN simultaneously. ENTER SWITCH LOCKED will appear briefly in the LCD message display.
9. Close the printer cover and place the printer on line.

Load Configuration Values

The previously saved default value set or the permanently stored *Printronix* factory value set can be loaded for use as needed. The following procedure provides a convenient method of resetting the printer configuration to a known value set.

1. Place the printer off line and raise the printer cover. Enable the ENTER switch by pressing MENU UP and MENU DOWN simultaneously. ENTER SWITCH NOT LOCKED will temporarily appear in the LCD message display.

2. Select and display the LOAD PARAMETERS main menu by pressing MENU DOWN and then NEXT or PREV.

3. Press MENU DOWN and then PREV or NEXT to select either the LOAD SAVED PARAMETERS or LOAD FACTORY PARAMETERS menu. If an IGP, IBM 3287, or IBM 5225 emulation board is installed, select the appropriate standard configuration listed in this menu.

4. Press ENTER once the desired selection is displayed in the LCD. The display will show LOAD SAVED COMPLETED or LOAD FACTORY COMPLETED.

5. To permanently save a configuration after all parameters have been changed as desired, select the SAVE PARAMETERS main menu and press ENTER. This will save the current parameter values as the default values.

6. Press CLEAR to return to OFFLINE READY.

7. Disable the ENTER switch by pressing MENU UP and MENU DOWN simultaneously. Close the printer cover and place the printer on line.

Control Panel Configuration Diagram

The Control Panel Configuration Diagram is a series of block diagrams that show the configuration menus and the parameters (values) available within each menu. The boxes represent the message display, the message that appears on the display is printed inside the box, and the letters outside the boxes adjacent to the directional arrows represent control panel switches. When a switch is pressed, an arrow leads to the displayed result of pressing that switch. The symbols used on the Control Panel Configuration Diagrams are summarized in Figure 3−2.

The diagram is presented in 3 levels, each level illustrating a particular set of parameter menus and values. The relationships between the three levels are summarized in Figure 3−3.

Level I − Print Format

Line Spacing
Print Mode
Forms Length Set

Level II − Main Configuration Menus

Ribbon Life xxx %	Host Interface
Character Set	Load Parameters
Application Compatibility	Save Parameters
Paper Format	Diagnostics

Level III − Configuration Menu Parameters

New Ribbon	Set Ribbon Size
Set Job Rate	When Worn Action
Analyze Job	Ribbon Life Enable/Disable
Select Set IBM PC	Select Set ECMA 94 Latin 1
Select Set Multinational	Select Set DEC Multinational
Printer Protocol	Unidirectional
Buffer Size	Select SFCC
Printer Select	Control Code 06
Paper Advance Switch	Control Code 08
80 − 9F Hex	Overstrike
Power−On State	Display Language
Alarm On Fault	

Auto Line Feed	Perforation Skip
Define CR Code	Paper Out
Define LF Code	PMD Fault
VFU Select	Print Width
VFU Table (Save/Clear)	
Centronics Interface Parameters	Data Rate
Dataproducts Interface Parameters	Word Length
Serial RS–232 Interface Parameters	Stop Bit
Data Bit 8	Parity
PI Line	Bit 8 Function
Data Polarity	CD and DSR
Response Polarity	CTS and DSR
Fast Busy	Data Term Ready
Strobe Polarity	Request To Send
Latch Data On	Reverse Channel
Data Protocol	
Load Saved Parameters	Load IBM 5225 Parameters
Load IGP Parameters	Load Factory Parameters
Load IBM 3287 Parameters	
Configuration Printout	E Plus TOF
Print Data Stream In Hex Code	All H's
Printer Test 8 Inch Width	Underline Only
Printer Test Full Width	Black Plot
Shift Recycle	Shuttle/Ribbon
All E's	Demonstration
Power On Time	Print Lines
Print Time	Print Pages
Shuttle Strokes	

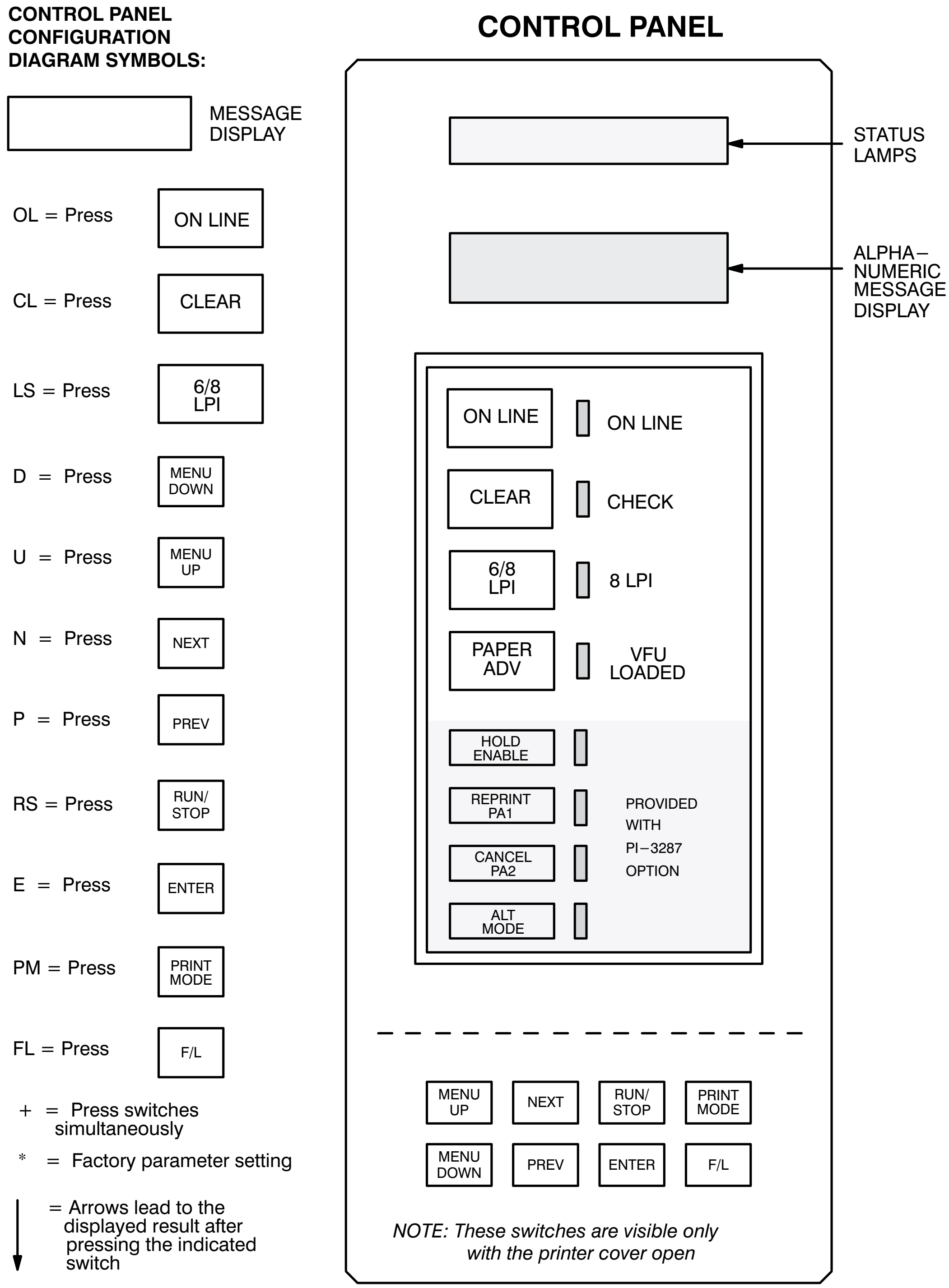


Figure 3–2. Control Panel Configuration Diagram Symbols

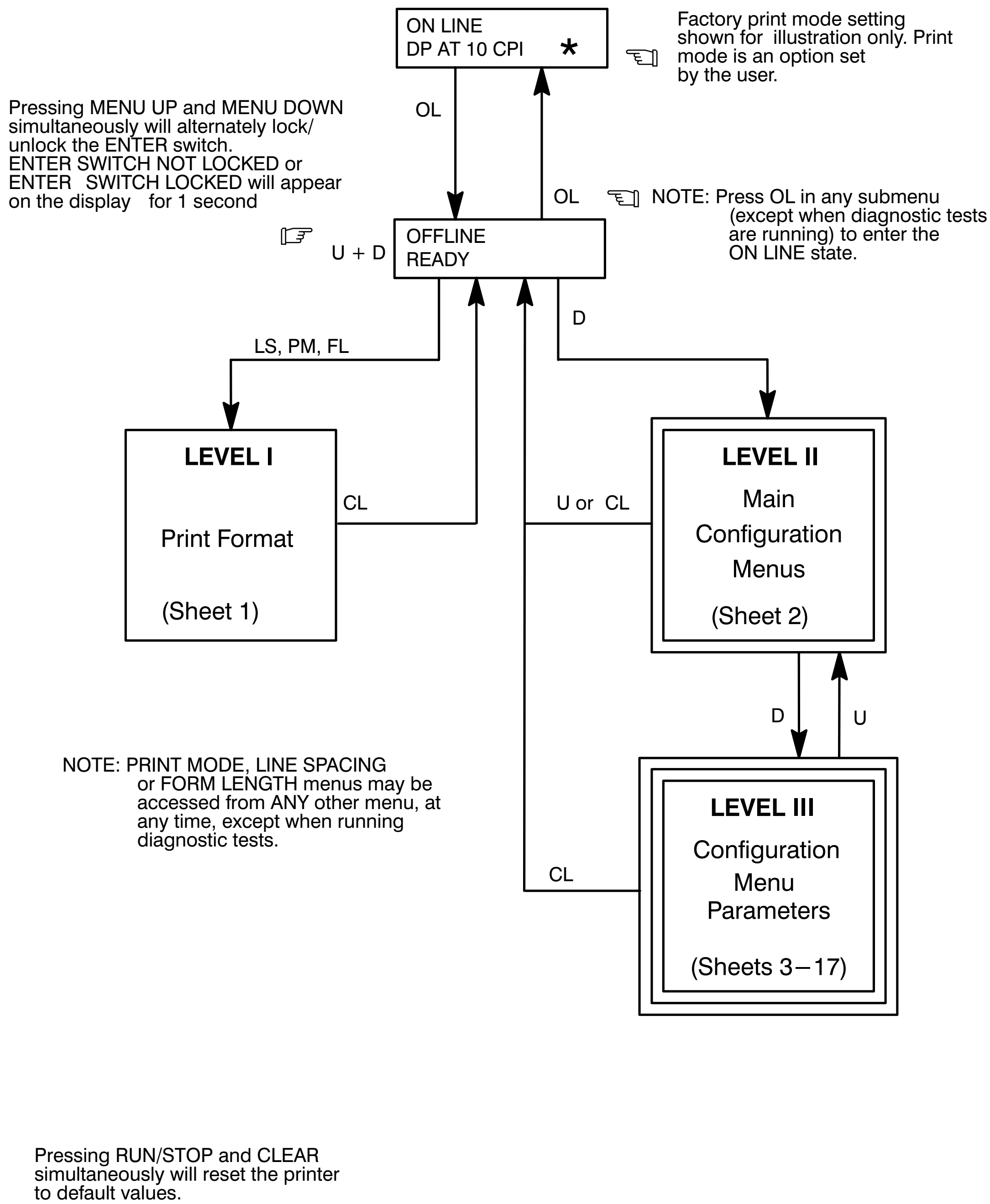
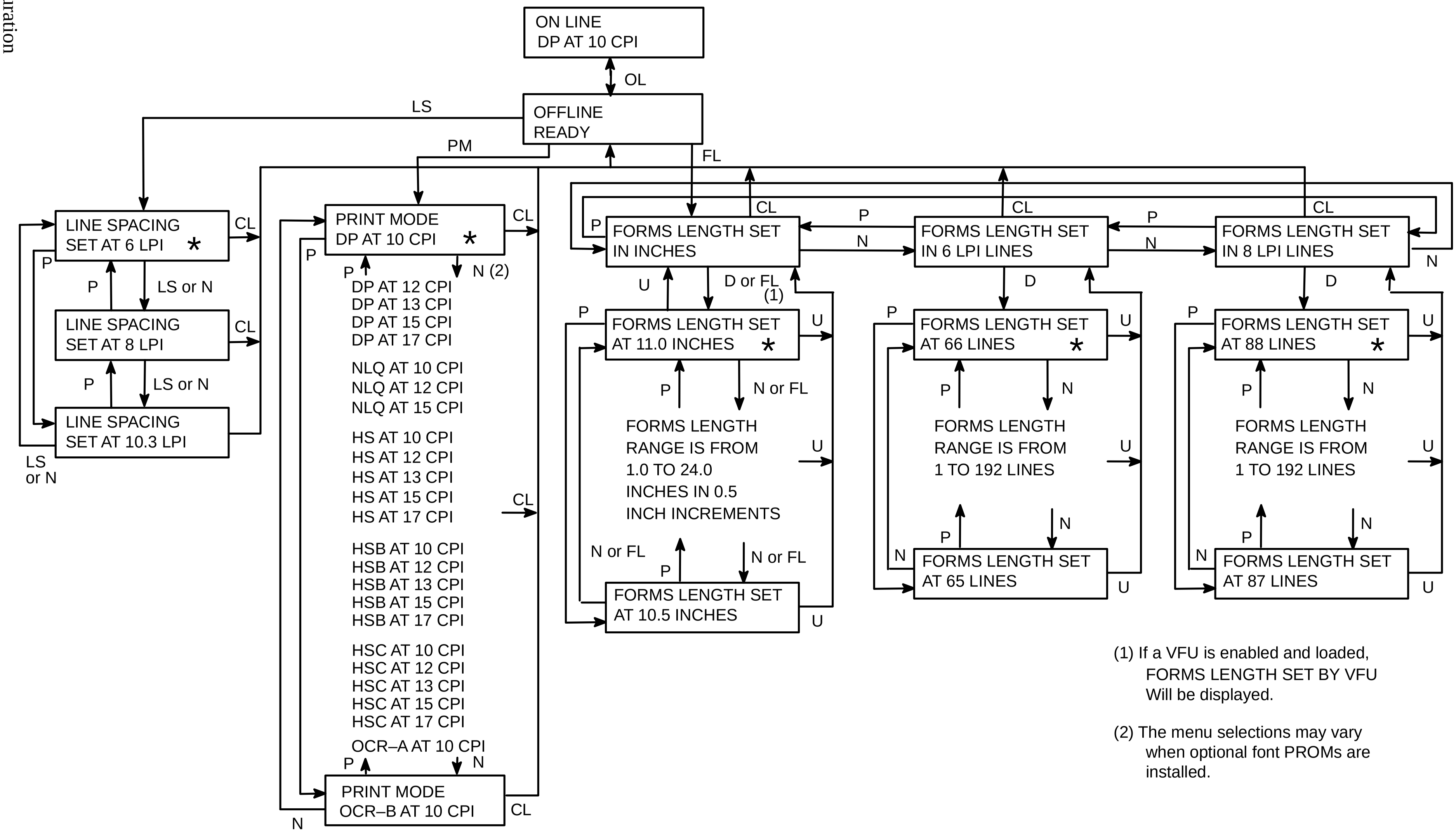


Figure 3−3. Control Panel Overview

LEVEL I – PRINT FORMAT



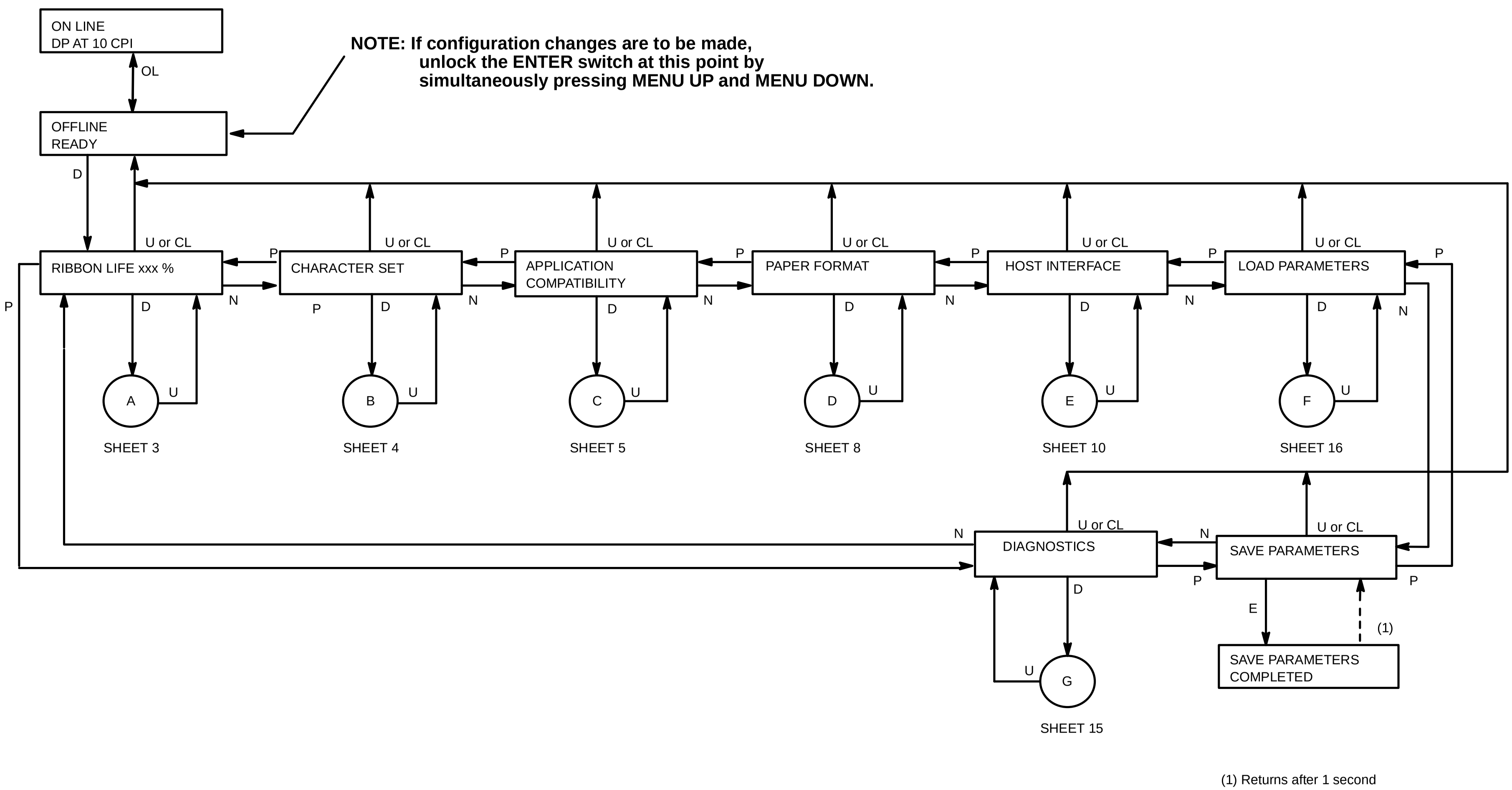
(1) If a VFU is enabled and loaded, FORMS LENGTH SET BY VFU Will be displayed.

(2) The menu selections may vary when optional font PROMs are installed.

Control Panel Configuration Diagram (sheet 1 of 17)

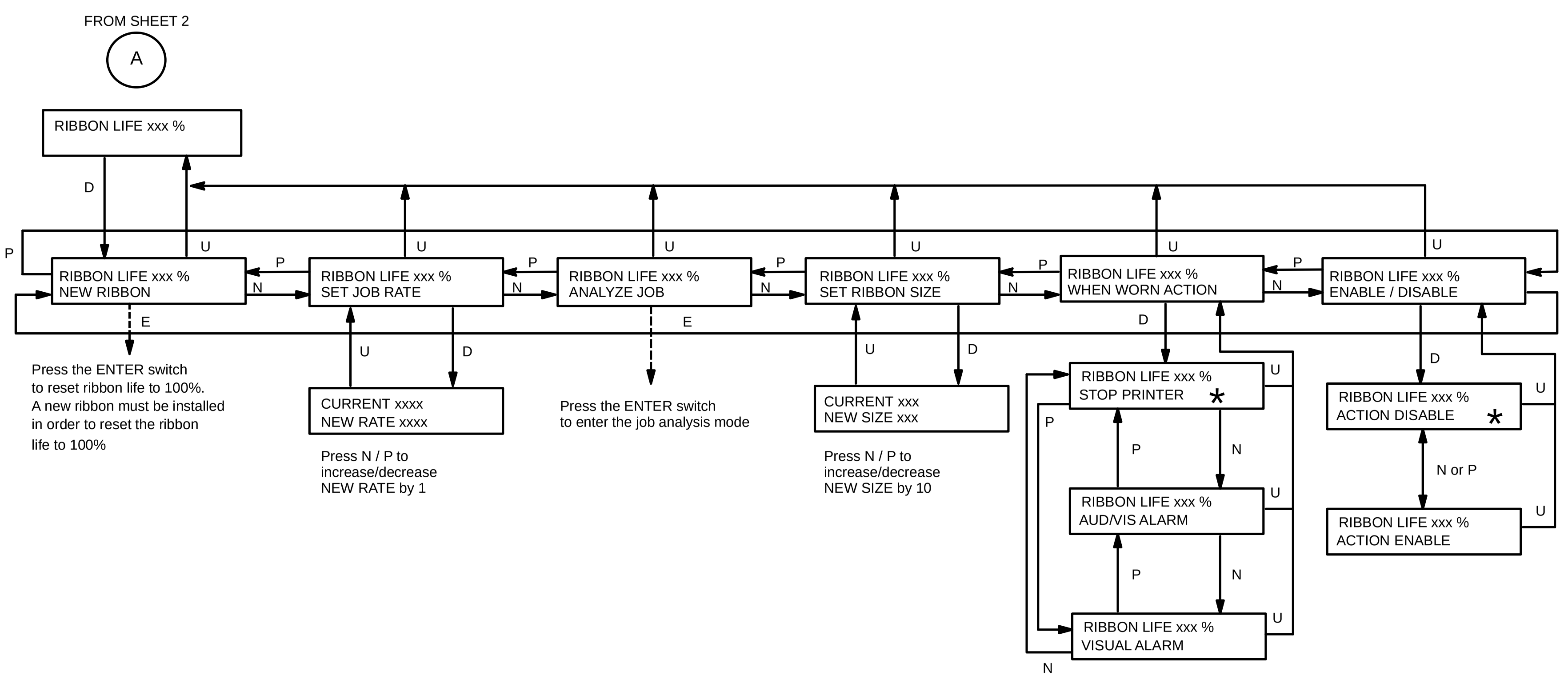
LEVEL II – MAIN CONFIGURATION MENUS

NOTE: If configuration changes are to be made, unlock the ENTER switch at this point by simultaneously pressing MENU UP and MENU DOWN.



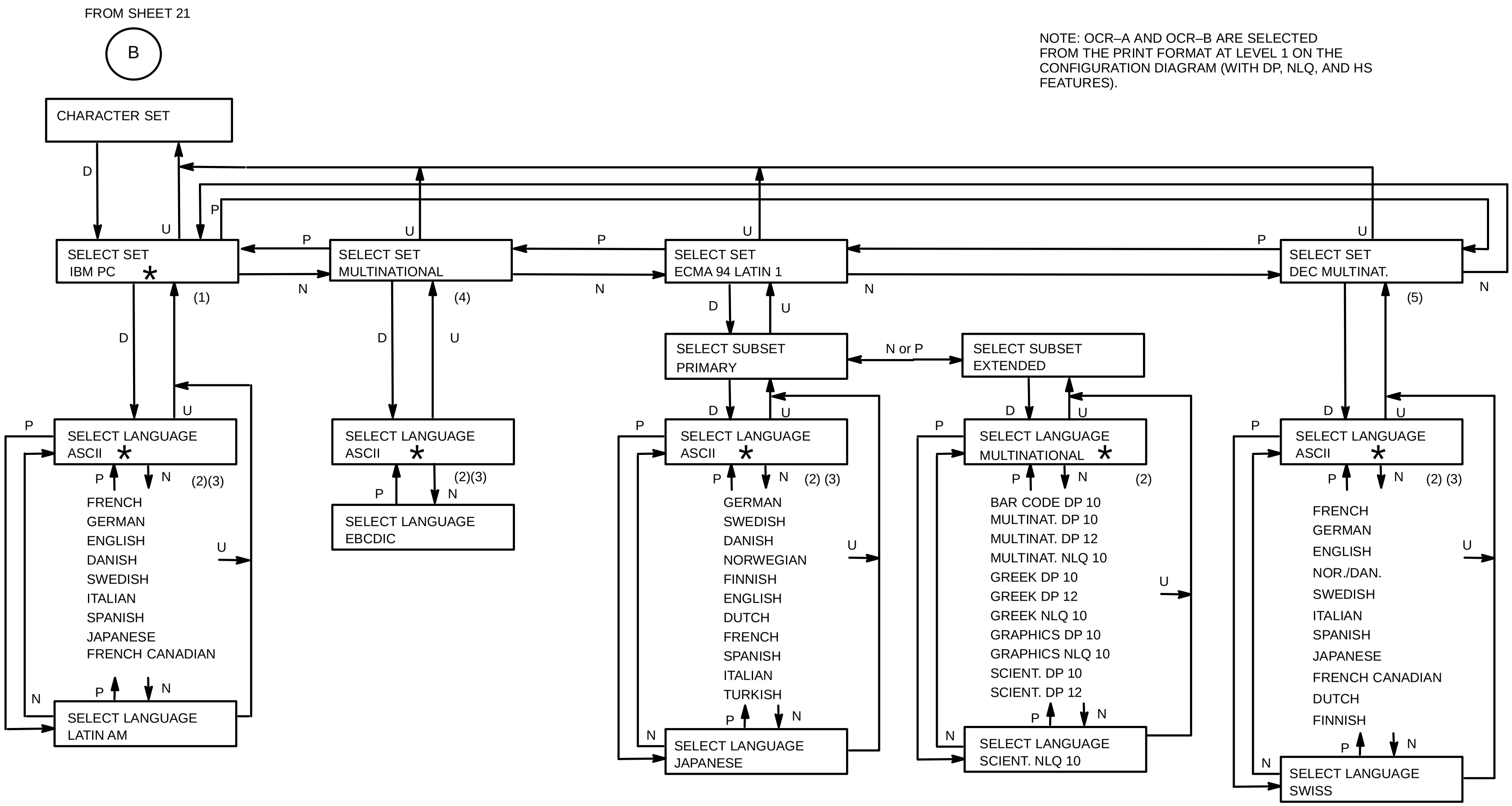
Control Panel Configuration Diagram (sheet 2 of 17)

LEVEL III – CONFIGURATION MENU PARAMETERS



Control Panel Configuration Diagram (sheet 3 of 17)

NOTE: OCR–A AND OCR–B ARE SELECTED FROM THE PRINT FORMAT AT LEVEL 1 ON THE CONFIGURATION DIAGRAM (WITH DP, NLQ, AND HS FEATURES).



(1) EXTENDED SUBSET is IBM PC GRAPHICS

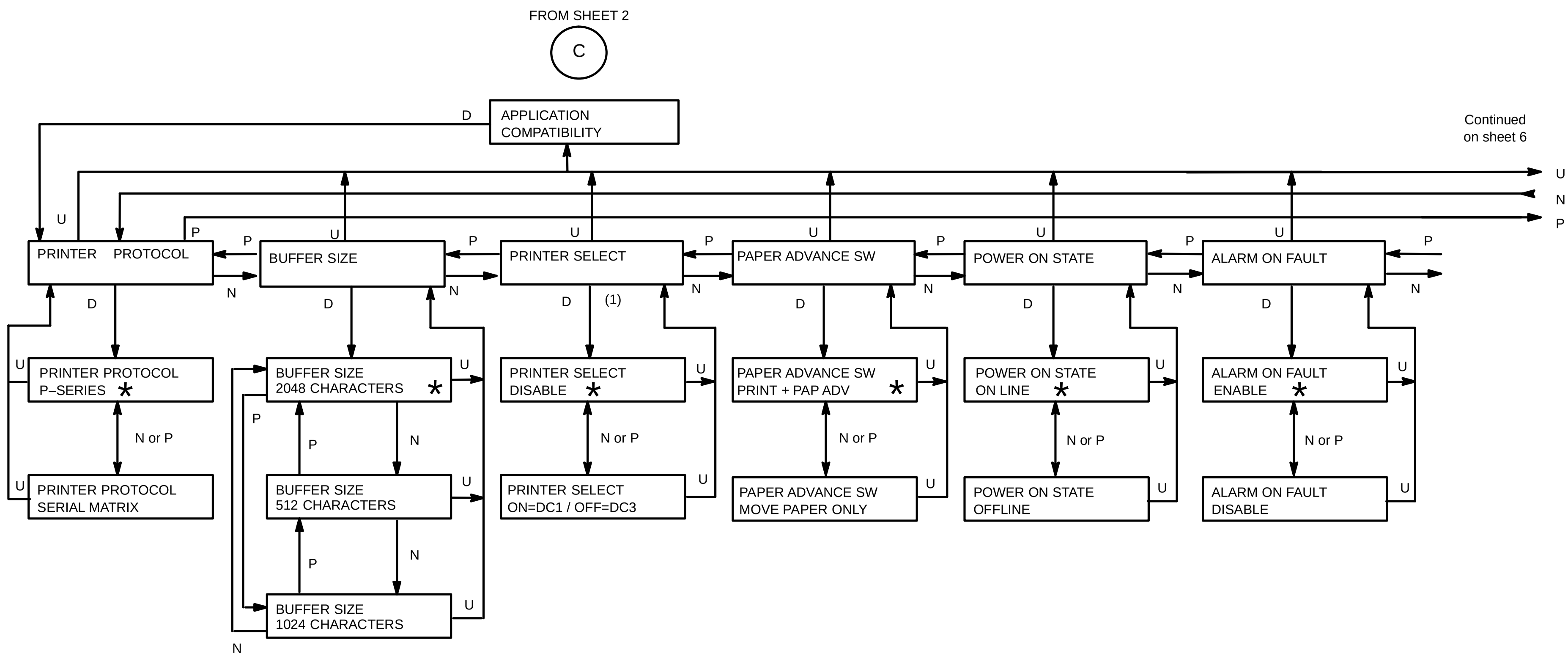
(2) Menu selections vary when optional fonts are installed

(3) DOWNLOADED shall be displayed when a downloaded substitution table is active

(4) EXTENDED SUBSET is MULTINATIONAL

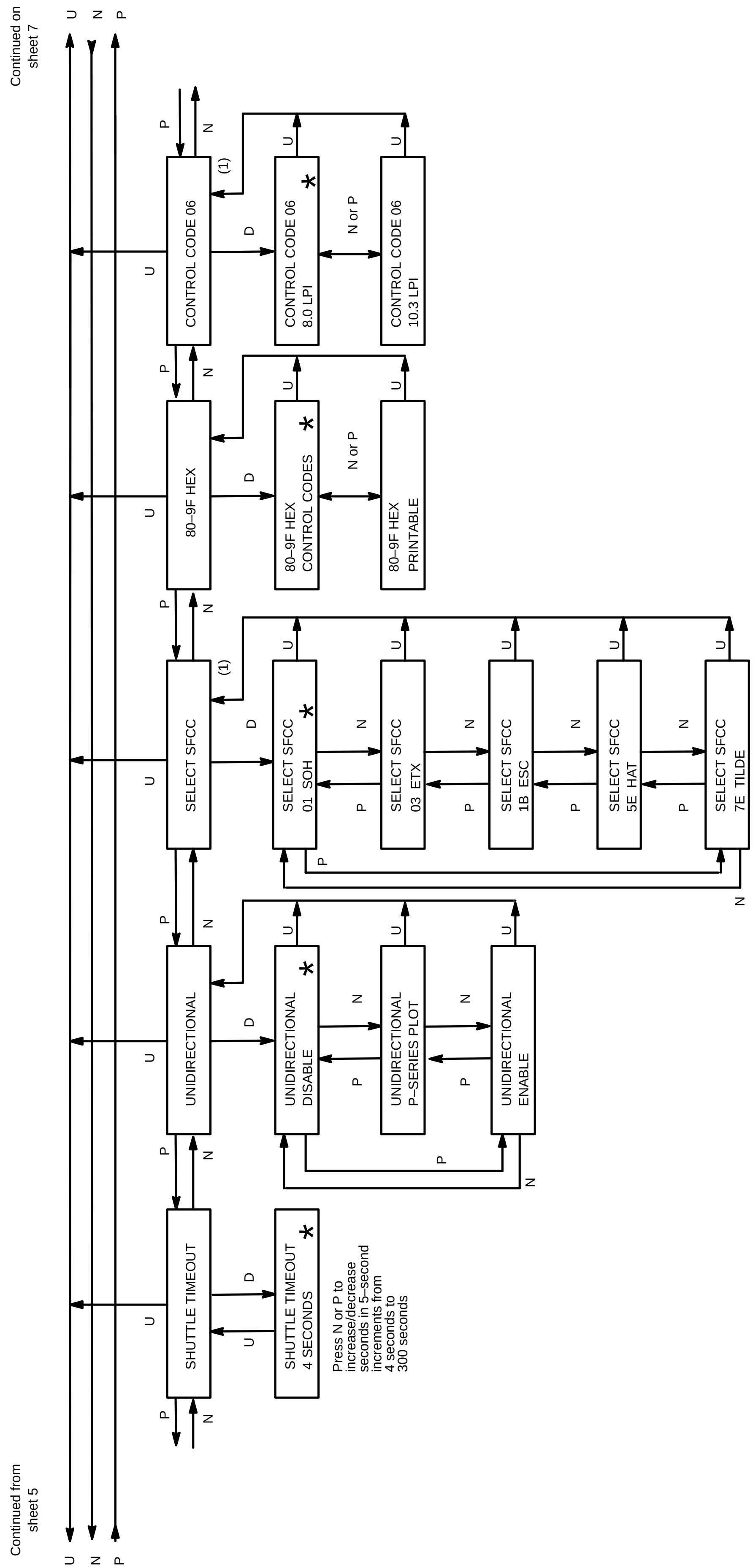
(5) EXTENDED SUBSET is DEC MULTINATIONAL

Control Panel Configuration Diagram (sheet 4 of 17)



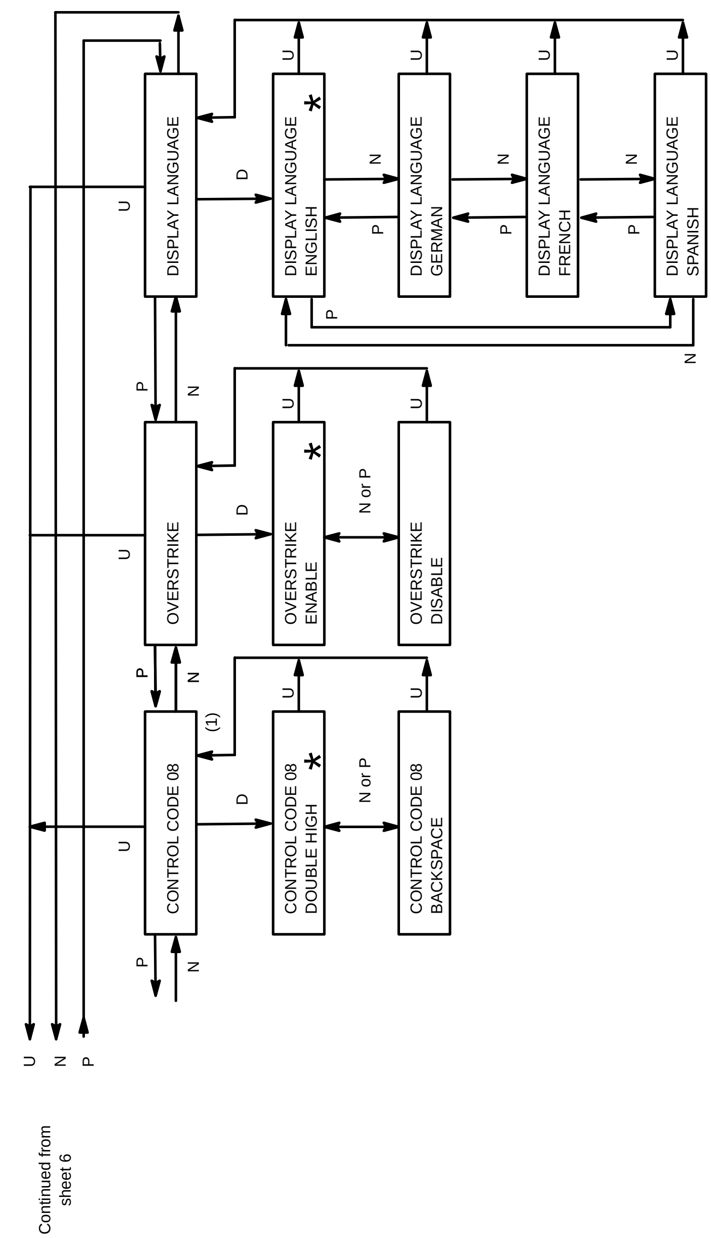
(1) Menu available inSerial Matrix protocol

Control Panel Configuration Diagram (sheet 5 of 17)



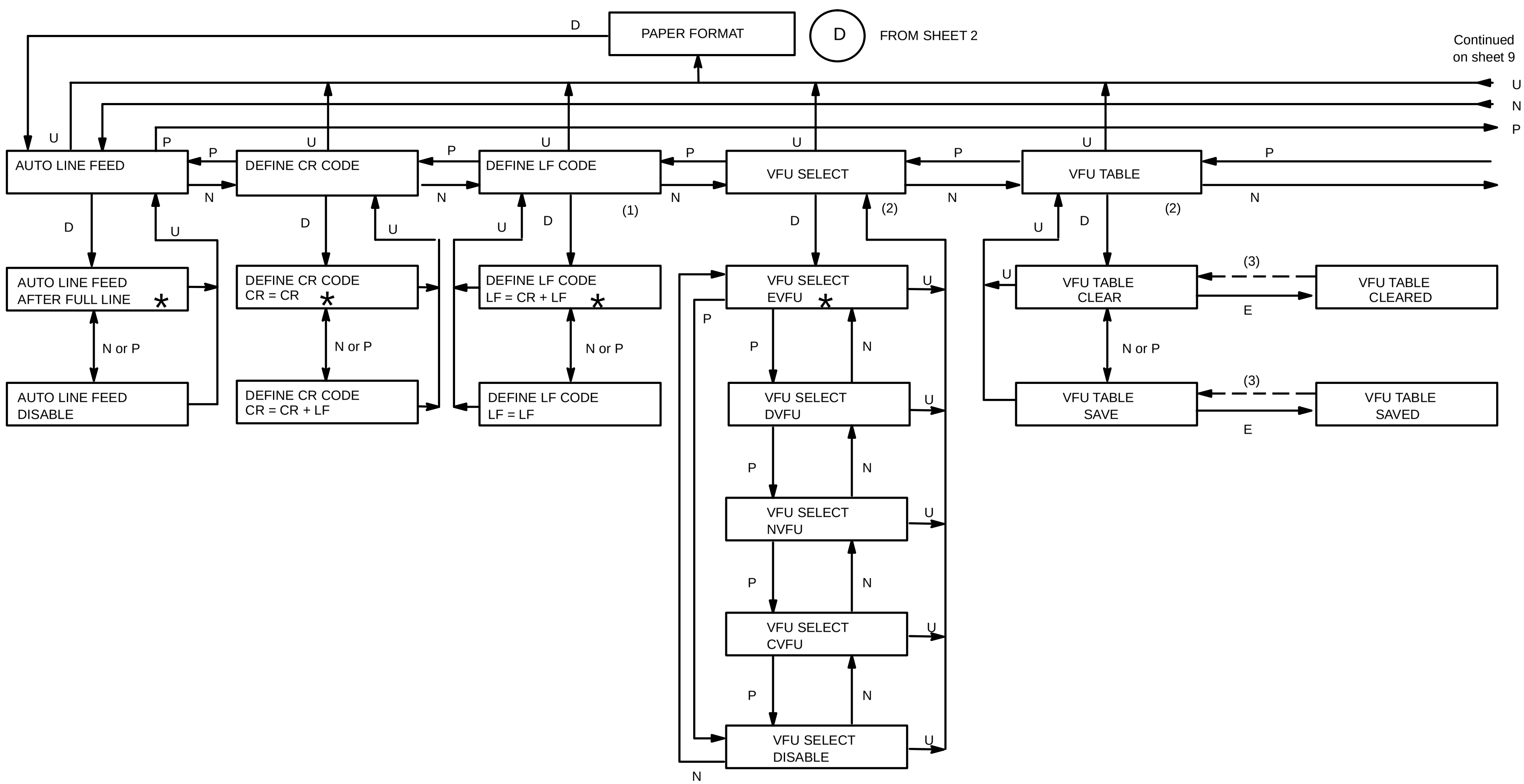
(1) Menu available in P–Series protocol

Control Panel Configuration Diagram (sheet 6 of 17)



(1) Menu available in P–Series protocol

Control Panel Configuration Diagram (sheet 7 of 17)

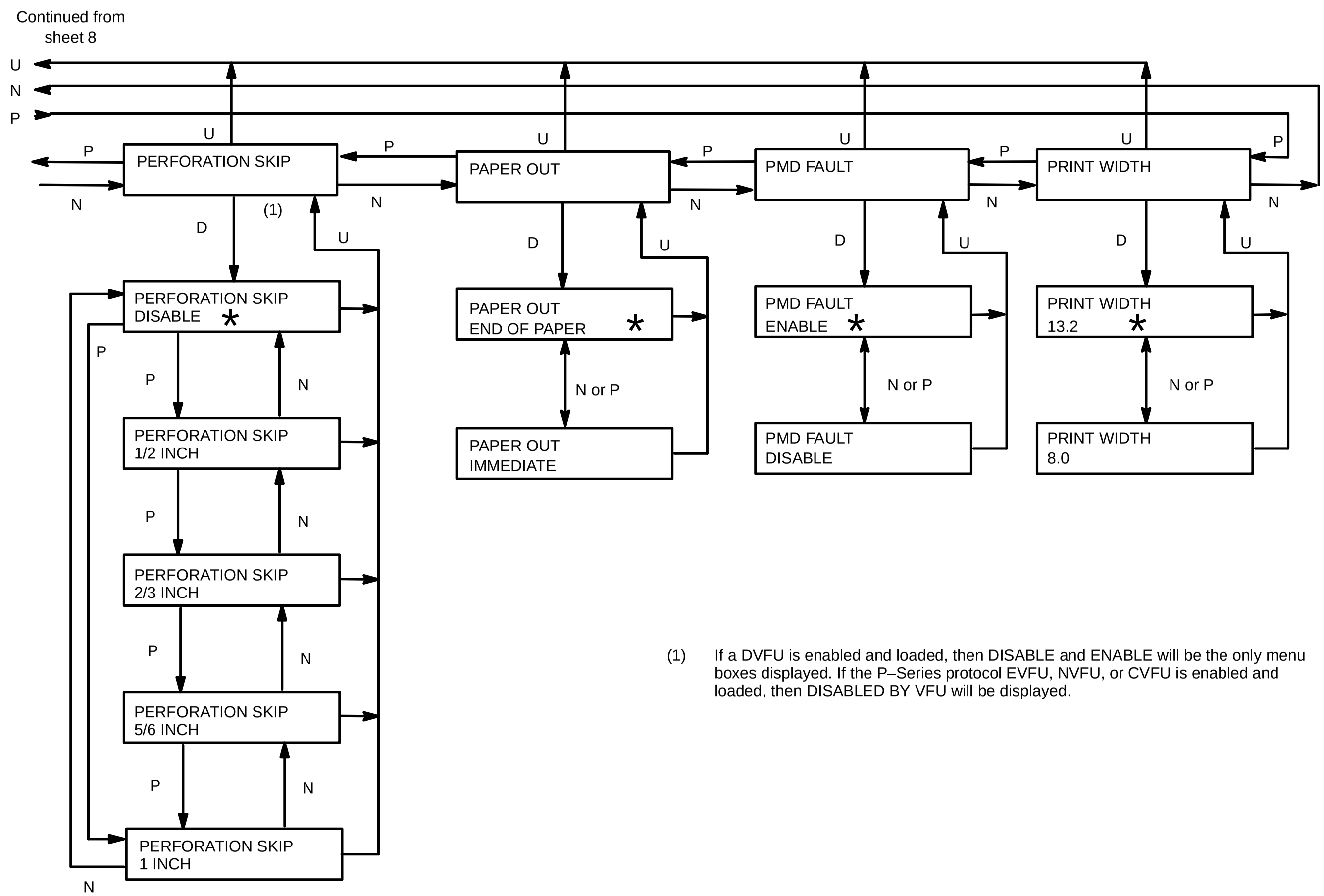


(1) Menu available in Serial Matrix protocol

(2) Menu available in P–Series protocol

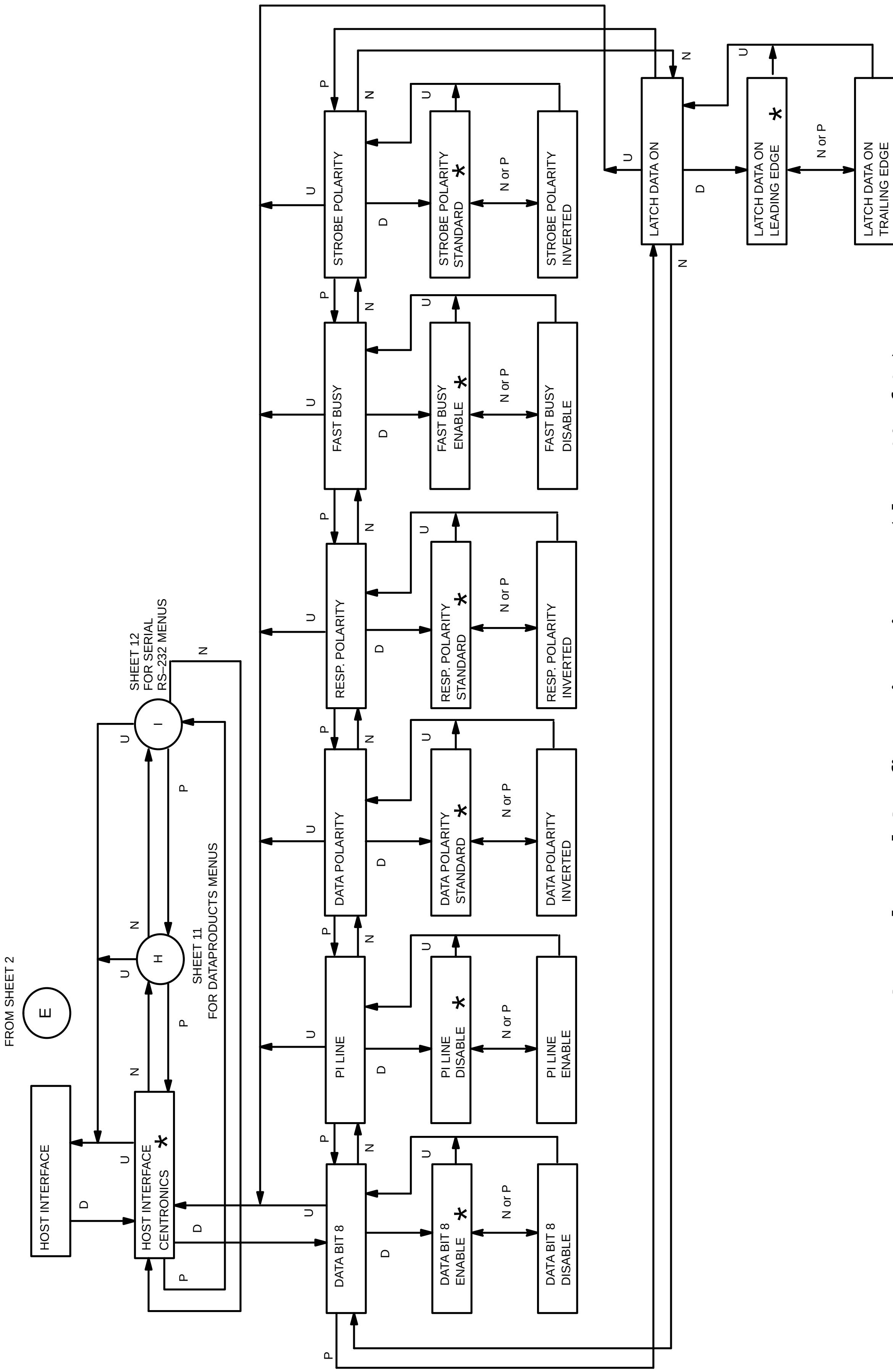
(3) Returns after 1 second

Control Panel Configuration Diagram (sheet 8 of 17)

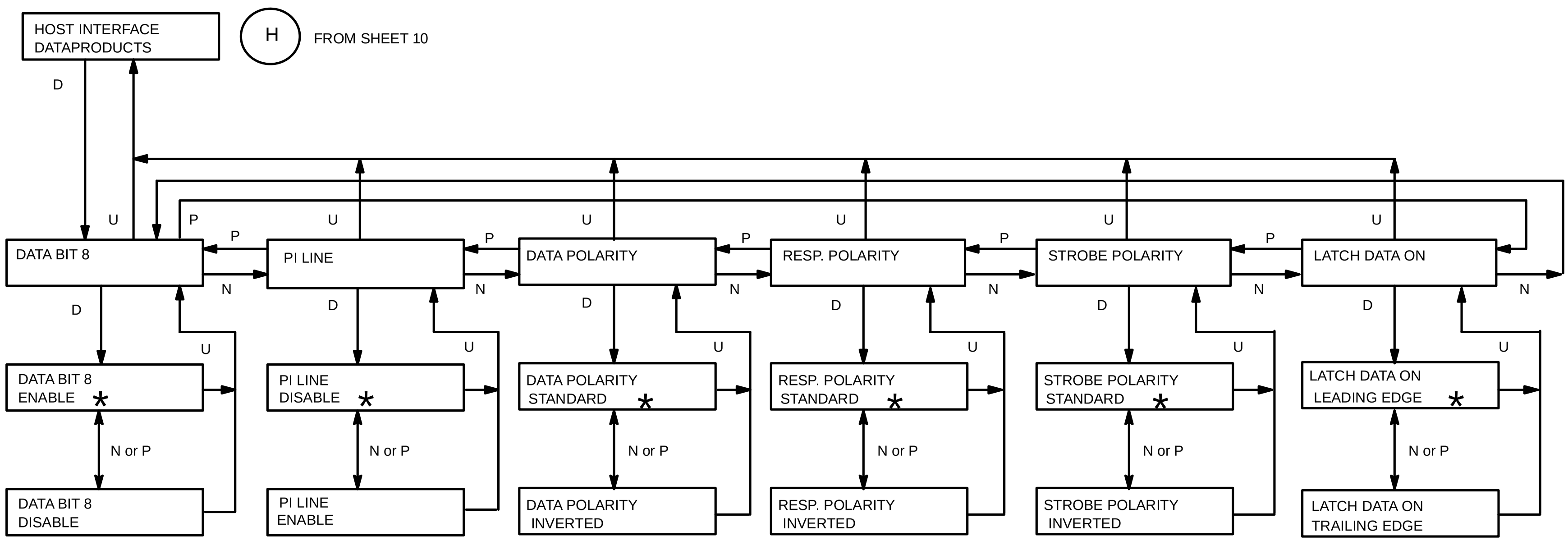


(1) If a DVFU is enabled and loaded, then DISABLE and ENABLE will be the only menu boxes displayed. If the P–Series protocol EVFU, NVFU, or CVFU is enabled and loaded, then DISABLED BY VFU will be displayed.

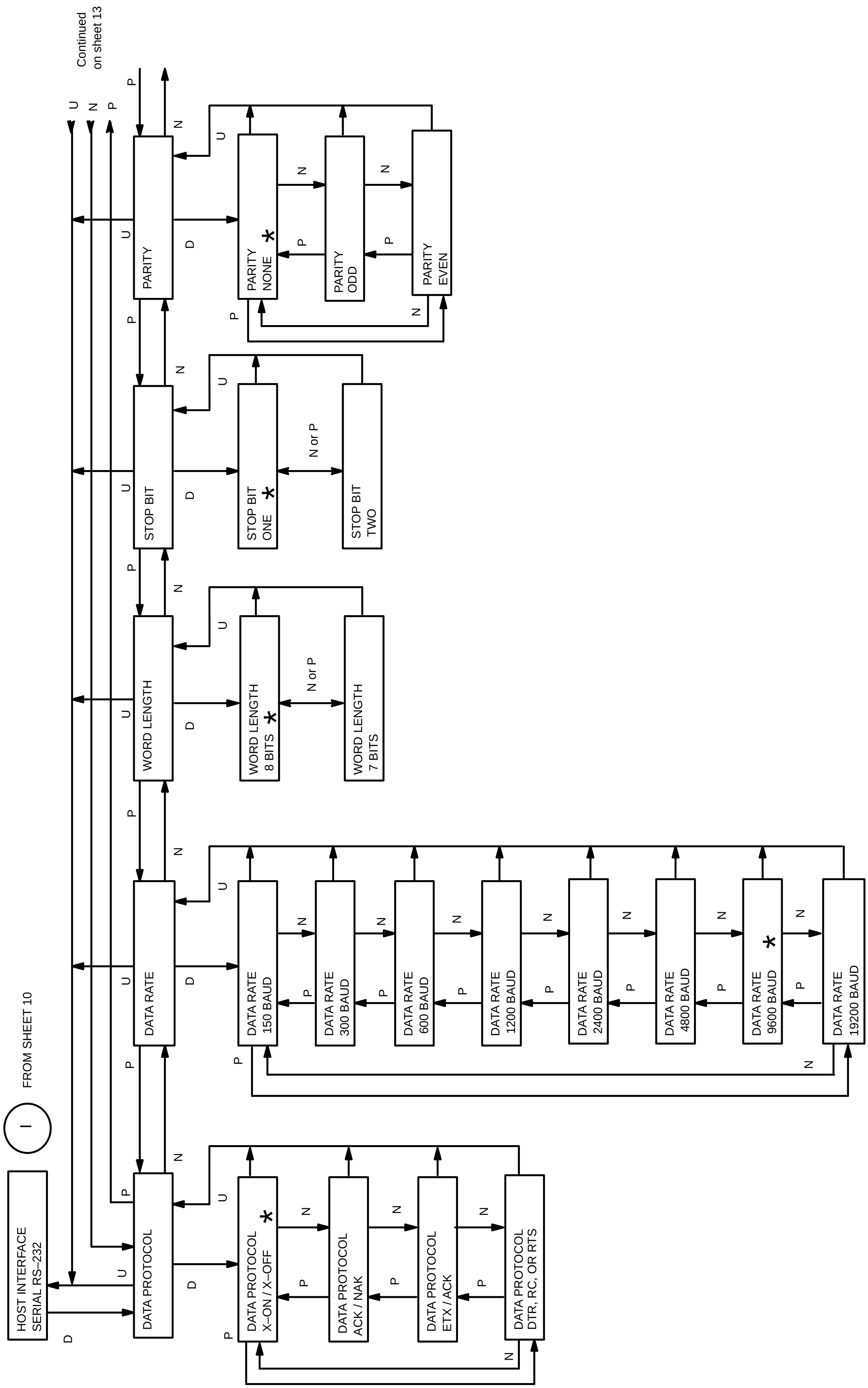
Control Panel Configuration Diagram (sheet 9 of 17)



Control Panel Configuration Diagram (sheet 10 of 17)

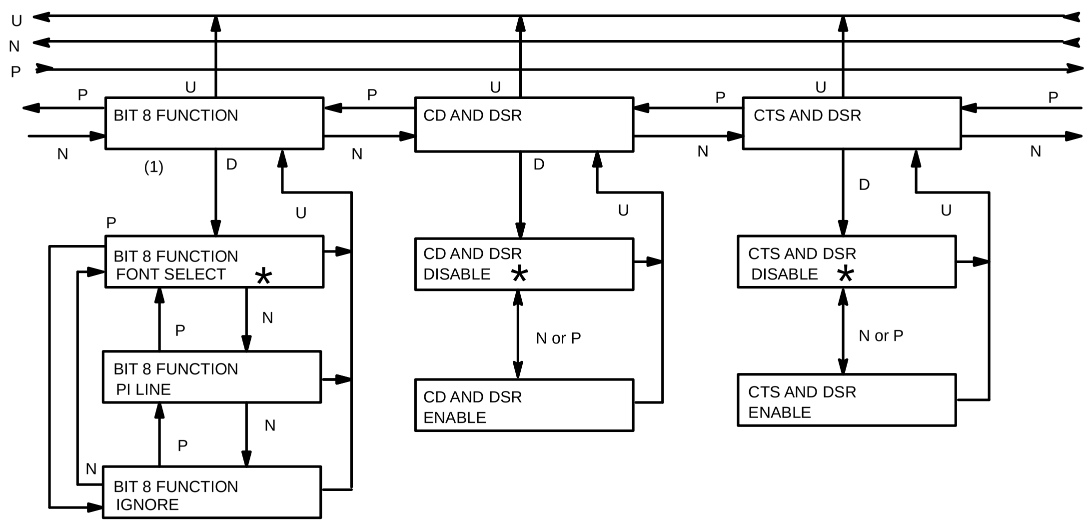


Control Panel Configuration Diagram (sheet 11 of 17)



Control Panel Configuration Diagram (sheet 12 of 17)

Continued from sheet 12

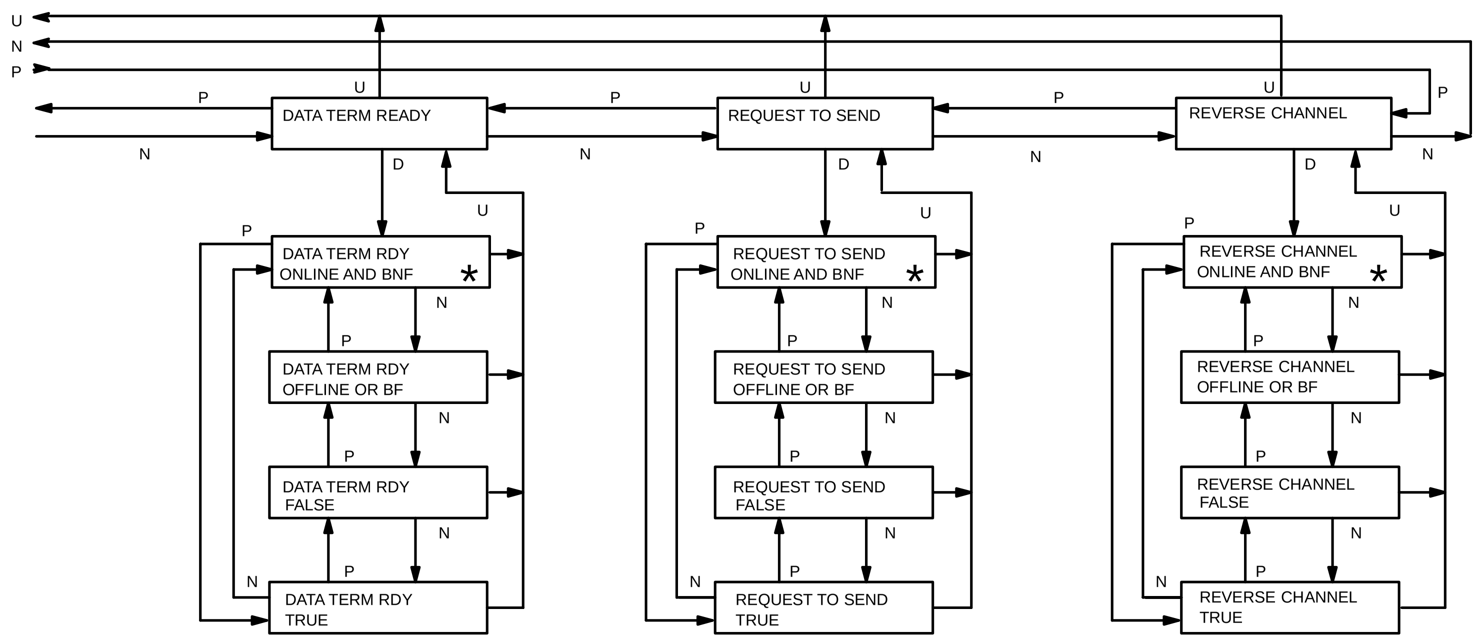


Continued on sheet 14

(1) Not applicable for a 7–bit word (NOT APPLICABLE displayed when appropriate)
Bit 8 will be received and acted on as a zero

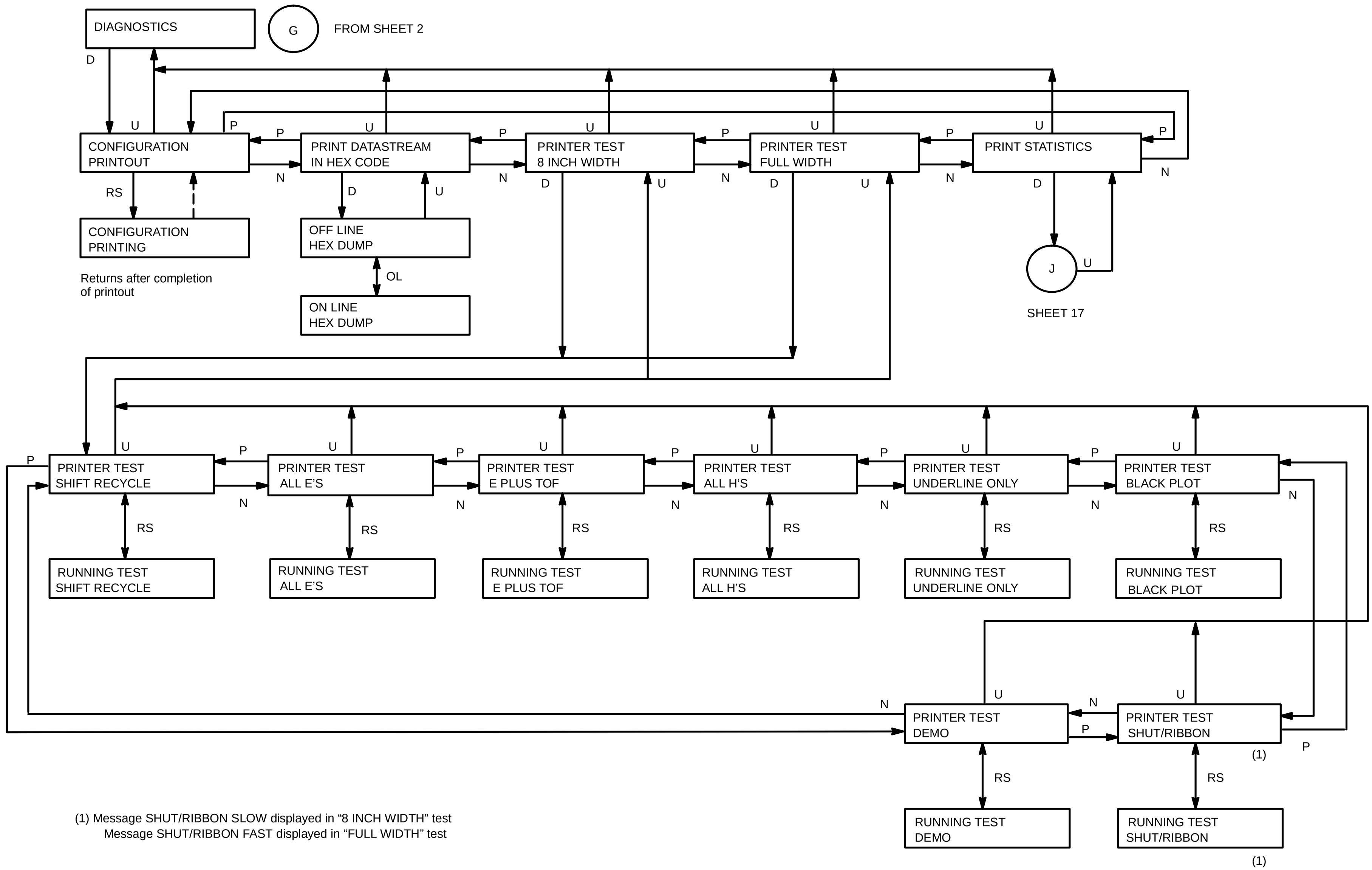
Control Panel Configuration Diagram (sheet 13 of 17)

Continued from sheet 13

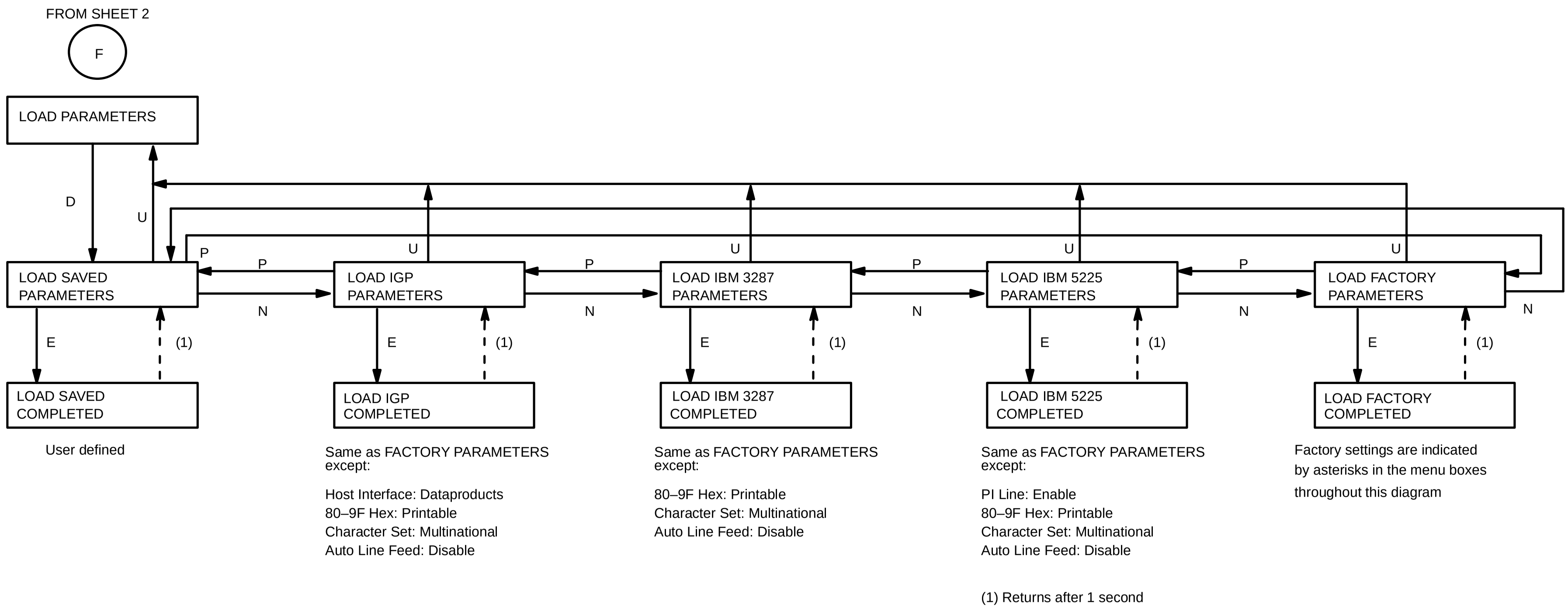


BF = BUFFER FULL
BNF = BUFFER NOT FULL

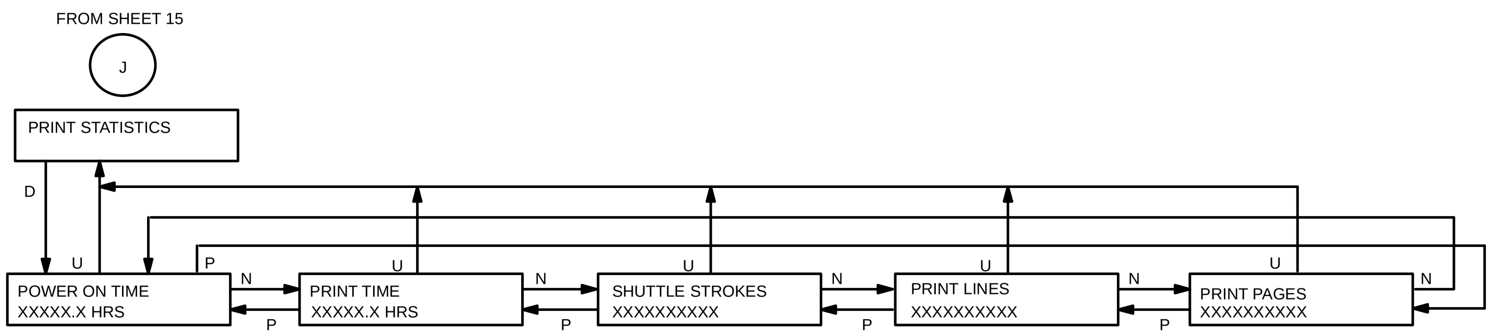
Control Panel Configuration Diagram (sheet 14 of 17)



Control Panel Configuration Diagram (sheet 15 of 17)



Control Panel Configuration Diagram (sheet 16 of 17)



Control Panel Configuration Diagram (sheet 17 of 17)

CHAPTER 4

GRAPHICS

Introduction

The printer can produce bit image graphics when in Serial Matrix protocol, and P−Series Plot Mode graphics when in P−Series protocol. You can print text and graphics on the same line *only* by using the bit image protocol in Serial Matrix protocol. In either mode, printing text is the default mode. Consequently, each line of graphics data must include the necessary plot mode commands to enable the printer to perform the desired graphics functions.

The following graphics information is presented in this chapter:

- Serial Matrix Compatible Bit Image Graphics
- P−Series Compatible Plot Mode
- Combining Graphics and Text

Serial Matrix Compatible Bit Image Graphics

The printer produces bit image graphics in Serial Matrix protocol. Bit image graphics are created by printing a series of vertical bit image data bytes which represent the binary code bit pattern. This method utilizes the “1” or “true” bit from a binary data byte to print dot patterns. These data bytes are actually the binary equivalent of ASCII character decimal values 0 through 255. When the data byte is rotated vertically, the result is a vertical data byte pattern with the most significant bit (MSB) at the top.

Plotting a Bit Image Pattern

A Bit Image pattern can be produced by following these steps:

1. Lay out the graphic(s) pattern to be printed on a quadrille pad or graph paper.
2. Determine the decimal equivalent of each bit image data byte required to produce the pattern (Figure 4−1).
3. Write a program to generate the complete pattern.
4. Enter and run the program on the host computer.

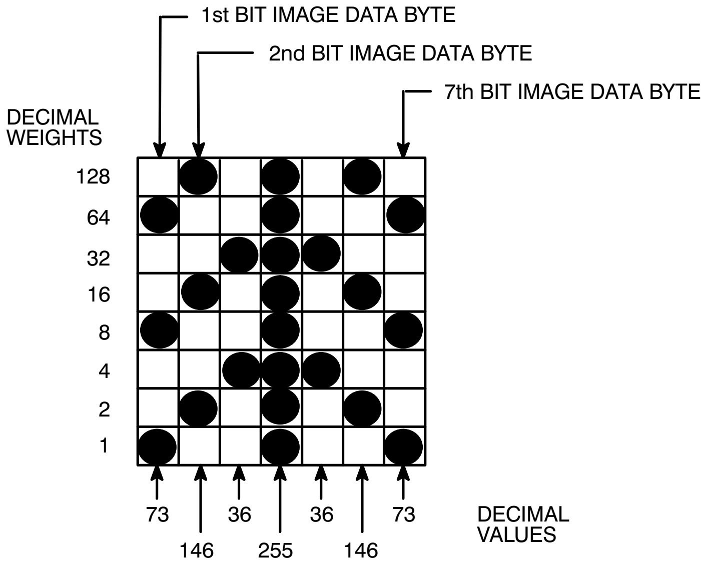


Figure 4−1. Bit Image Pattern Plan

How Bit Image Graphics Are Produced

The binary data byte bit pattern for the ASCII character “A” (hex 41, decimal 65) is pictured in Figure 4−2.

- If this data byte is rotated clockwise, the result is a vertical data byte pattern with the most significant bit (MSB) at the top.
- If each “1” or true bit is plotted, the result is a bit image plot of the ASCII character “A.”

The relationship of ASCII character, decimal value, and Bit Image plot is shown in Figure 4−3.

- The data bytes can be identified by their binary, octal, hexadecimal, or decimal equivalents. These are used to generate a Bit Image pattern.
- Bit Image plotting is not limited to printable ASCII characters; Bit Image patterns can be plotted for any 8−bit data byte with decimal values ranging from 0 to 255.
- The standard ASCII character chart and its equivalents is provided in Appendix A.

NOTE: Bit Image Graphics is recommended in the DP print mode (120 X 72 dpi). Vertical density variation in other print modes may cause white horizontal bars or overlapping of adjacent graphics lines; however, changing the line spacing can correct this problem.

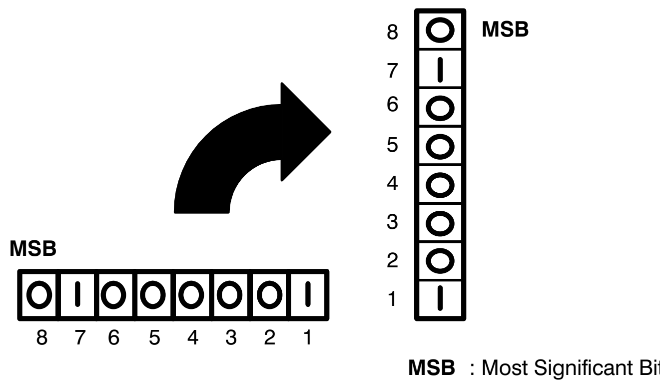


Figure 4−2. Vertical Data Byte Pattern

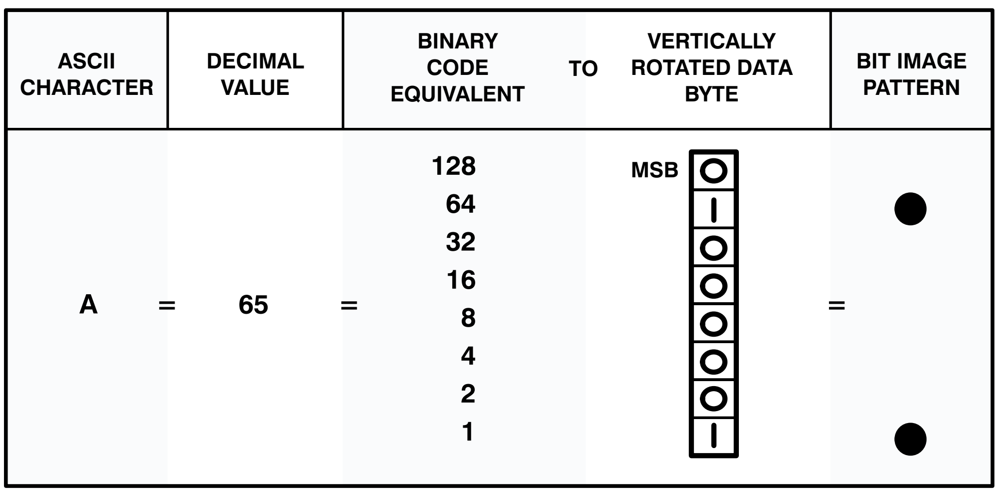


Figure 4−3. Bit Image Pattern from an ASCII Character

Bit Image Density

Bit image graphics may be printed in different dot densities. Dot densities are selected by control code:

- **Control code ESC K** selects the **Single Density Mode**.

  Single Density bit image graphics in the Data Processing print mode are printed at 60 dots per inch (dpi) horizontally and 72 dpi vertically. In the Correspondence print mode, the horizontal dot density is 90 dpi and vertical dot density is 96 dpi. In the High Speed (HS) mode, horizontal dot density is 60 dpi and vertical dot density is 48 dpi.

- **Control code ESC L** selects the **Double Density Mode**.

  The Double Density mode prints up to twice the number of dots per inch horizontally in the same space as used for Single Density. The vertical dot density remains the same as in the Single Density mode. Double horizontal density requires twice the number of input data bytes to print the same length line as for Single Density. Printing double density reduces the printing speed by half.

- **Control code ESC Y** selects the **Double Speed, Double Density Mode**.

  When the Double Density, Double Speed control code is received, the data will be printed at double the current horizontal dot density, but adjacent dots are not printed. Since Double Density graphics are printed at half speed, Double Speed, Double Density graphics are printed at the same speed as are Single Density graphics.

- **Control code ESC Z** selects the **Quadruple Density Mode**.

  When printing Quadruple Density graphics, the printer pairs adjacent quadruple density bit image bytes. The compounded data is then printed in the Double Density mode.

Bit Image Programming Format

The general Bit Image expression is:

ESC CC(n1)(n2)DATA
where:

ESC	=	the Serial Matrix compatible header
CC	=	K, L, Y or Z to select dot density (K=single, L=double, Y=double−density, double speed Z=quadruple density)
n1, n2	=	n1 + 256 n2 defines the number of data bytes to follow
DATA	=	the dot pattern bytes

- The syntax of the Bit Image expression must be correct.
- The expression must include the appropriate dot density control code, the number of bytes of data to be plotted, and the data itself.
- The number of data bytes and the n1, n2 definition must be equal.
- Any characters following n1 and n2 will be interpreted and plotted as data until the n1, n2 definition is satisfied.
- If n1 = n2 = 0, then control codes K, L, Y, or Z are ignored.

n2	=	700/256 = 2
n1	=	700−(2x256) = 700−514 = 188

The program statement is: ESC K (188)(2)(DATA)

NOTE: Depending on the host computer system, it may be necessary to include a width statement within the BASIC program.

- The maximum number of data bytes that can be included in the DATA portion of the program statement (when using 132 column paper) varies according to the operating mode:

At 60 dpi, Single Density = 792 bytes;
Double Density = 1584 bytes
Quadruple Density = 3168 bytes

- Data in excess of the right margin is discarded. If the auto line feed is enabled, data in excess of the right margin will cause a Line Feed (LF) and continue printing on the next line.

A detailed description of the individual bit image control codes with examples is provided in the Programming chapter.

Bit Image Sample Program

The following sample program written in BASIC produces Single Density bit image graphics of the pattern shown in Figure 4−1. The 7 data bit pattern is repeated 40 times. The printed result of running the program is shown in Figure 4−4.

```
10 LPRINT "Single Density Bit Image Graphics"
20 LPRINT CHR$(27);"K";CHR$(24);CHR$(1);
30 FOR N=1 TO 40
40 RESTORE
50 FOR I=1 TO 7
60 READ R
70 LPRINT CHR$(R);
80 NEXT I
90 NEXT N
100 DATA 73, 146, 36, 255, 36, 146, 73
110 LPRINT
```

Figure 4−4. Sample Single Density Bit Image Graphics

P−Series Compatible Plot Mode

P−Series compatible odd/even dot Plot Mode is available only in P−Series printer protocol. Plot Mode allows any individual dot position to be addressed and printed. This produces a variety of graphics, including bar codes, complex curve graphs, pie and bar charts, block characters, or halftones.

Plot Density

Plot density refers to the number of dots per inch (dpi) printed in a single dot row. Two types of plot density are available with P−Series Plot Mode graphics: normal density and double density.

In **Normal Density Plot**:

- The mode is selected with the odd dot plot control code ENQ (05 hex).
- The odd–numbered dot columns are addressed to produce a horizontal and vertical density that varies, based on the mode of operation:

Print Mode	Horizontal dpi	Vertical dpi
Data Processing (DP)	60	72
Correspondence (NLQ)	90	96
High Speed A (HS)	60	48
High Speed B (HSB)	60	72
High Speed C (HSC)	60	72

- Different print modes cannot be mixed on the same dot row.

Figure 4–5 illustrates normal density dot plot.

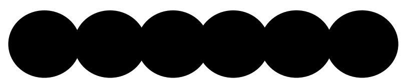


Figure 4–5. Normal Density Plot

In **Double Density Plot**:

- Two separate shuttle strokes produce double density plot. First the even plot command (EOT, 04 hex) and dot data are sent, followed by the odd plot command (ENQ, 05 hex) and dot data, allowing a maximum of 1584 dots in a single dot row at 60 dpi.
- Even dot plot is sent first for control of the initial plot pattern; then odd dot plot is sent for control of the final dot pattern.
- The dots average .017” in diameter.
- The vertical density remains the same in normal and high density plotting.

Figure 4–6 illustrates double density plotting.

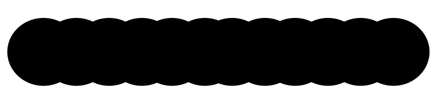


Figure 4–6. Double Density Plot

Plot Data Byte Format

In P−Series Plot Mode, the format is as follows:

- Each data byte specifies six out of twelve dot columns.
- Using odd dot plot mode, bits 1 to 6 of the data byte address the odd−numbered dot columns; using even dot plot mode, bits 1 to 6 of the data byte address the even−numbered dot columns.
- Bit 6 and/or bit 7 of the data byte must be a "1" (or true) bit in the Plot mode.
- Bit 8 of the data byte is not used in the Plot mode and may be either a 1 or 0.
- The binary equivalent of the plot data bytes must be known to accurately address specific dot positions.

As shown in Figure 4−7, a dot is printed at the location addressed by each of bits 1 to 6 in the data byte that is set (1 or true).

NOTE: Bit order in this example is reversed.

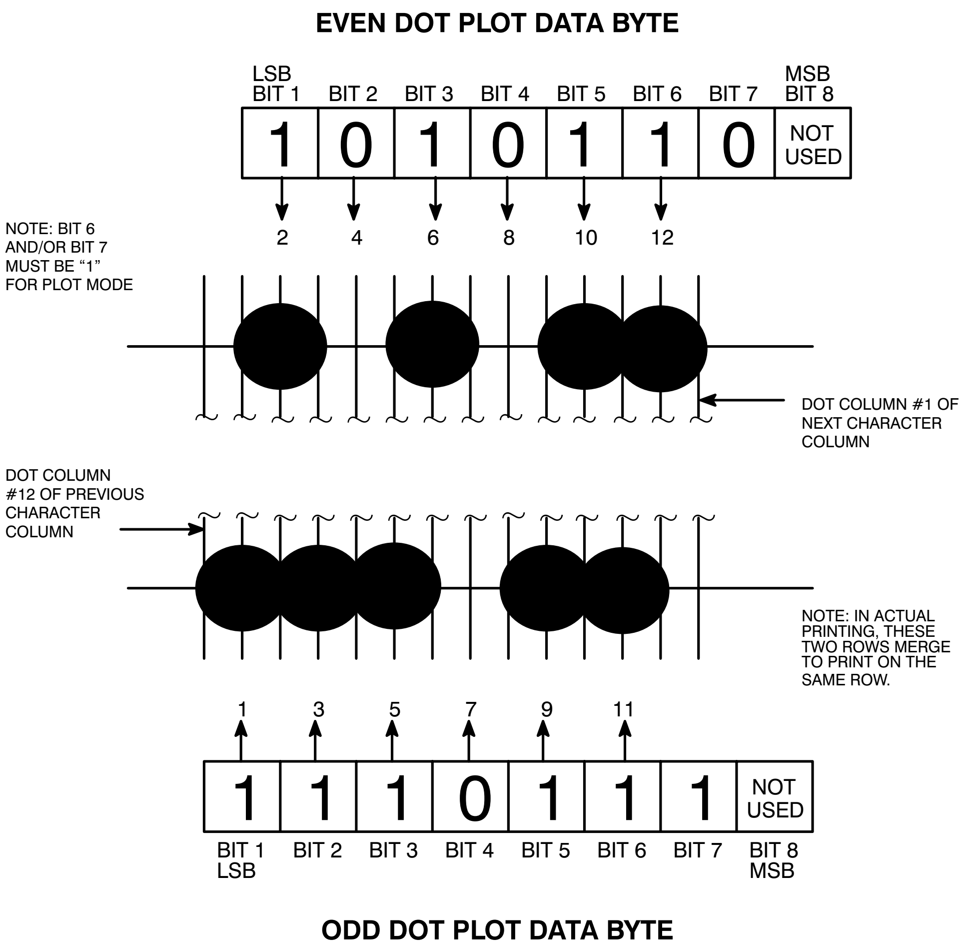


Figure 4−7. P−Series Plot Data Byte Format

Plot Data Line Format

A plot data line may contain any number of plot data bytes up to the maximum of 132 for horizontal dot density of 60 dpi (Data Processing mode) or 198 bytes for a horizontal dot density of 90 dpi (Correspondence mode). If Auto Line Feed is disabled, any bytes over the maximum are lost. If the maximum is exceeded and Auto Line Feed is enabled, a Line Feed (LF) is forced and the remaining plot data is printed as text on the next line.

The plot mode control code may occur anywhere in the line prior to the line terminator, but plot speed may decrease if it is not at the beginning of the line.

NORMAL DENSITY PLOT

For normal density plot, the plot line contains: Control Code 05 hex, plot data bytes, and a Line Terminator (0A hex or 0C hex). The control sequence for sending the P−Series **Normal Density Plot** is as follows:

1. Send the plot command code ENQ (05 hex).

2. Send the plot data bytes (refer to NO TAG on page NO TAG).

3. Send a line terminator, either a Line Feed (LF, 0A hex) or a Form Feed (FF, 0C hex). A Carriage Return (CR) may also be used instead of the LF code, provided the Carriage Return has been configured for Carriage Return = Carriage Return + Line Feed (CR = CR + LF).

   a. A line feed (0A hex) used as the line terminator causes the contents of the buffer to be plotted and the paper advances a *single dot row*, based on the vertical density of the current mode.

   b. A form feed (0C hex) used as the line terminator causes the contents of the buffer to be plotted and the paper to advance to the *top of the next form.*

4. Regardless of which line terminator code is sent, the printer will default to the previously selected print mode unless further plot control codes are provided with the data.

NOTE: Failure to adhere to this format may cause unexpected results.

DOUBLE DENSITY PLOT

For double density plot, the plot line contains: Control Code 04 hex, plot data bytes, a Line Terminator (0A hex or 0C hex), Control Code 05 hex, plot data bytes, and a Line Terminator. The control sequence for sending P−Series **Double Density Plot** is as follows:

1. Send the even dot plot control code EOT (04 hex), followed by plot data bytes (refer to NO TAG on page NO TAG).

2. Send a line terminator, which causes the printer to plot the data bytes; the paper is *not* advanced in Double Density Plot; the printer now waits for the second plot command and plot data bytes.

3. Send the odd dot plot control code ENQ (05 hex) and a second line of data, followed by a line terminator.

   a. A line feed (0A hex) used as the line terminator causes the contents of the buffer to be plotted and the paper advances a *single dot row*, based on the vertical density of the current mode. A CR (if CR = CR + LF is configured) may also be used with the same result.

   b. A form feed (0C hex) used as the line terminator causes the data bytes to be plotted and the paper to advance to the *top of the next form.*

4. Regardless of which line terminator code is sent, the printer will default to the previously selected print mode unless further plot control codes are provided with the data.

NOTE: Failure to adhere to this format may cause unexpected results.

Plotting the Data

P−Series Plot Mode plots the image from the horizontal bit pattern. Figure 4−8 duplicates the pattern shown in Figure 4−4 but is modified for Odd Dot Plot. Eight dot rows are required, two characters per row, six columns per character. (The dots required to produce the pattern are shown in NO TAG on page NO TAG.)

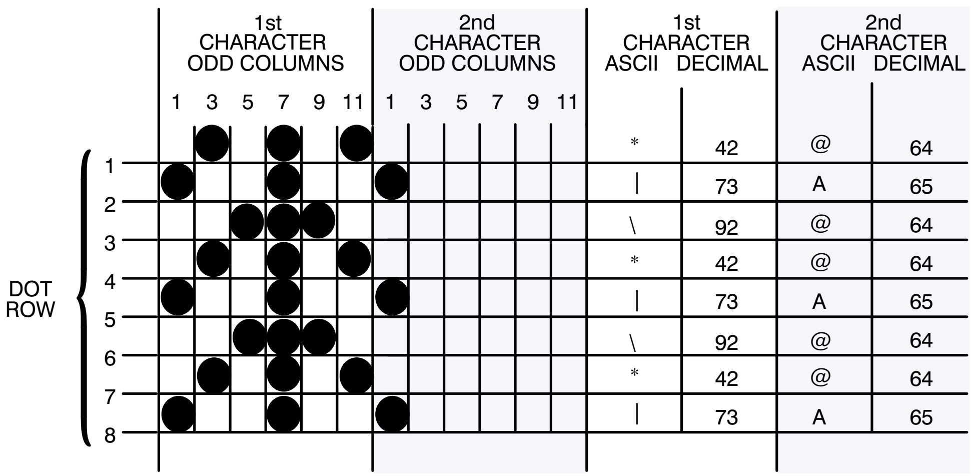


Figure 4−8. Odd Dot Plot Pattern Plan

The following program uses the Odd Dot Plot control code to produce the image.

```
10 LPRINT "Odd Dot Plot"
20 FOR I=1 TO 8
30 READ R1
40 READ R2
50 LPRINT CHR$(5);
60 FOR N=1 TO 25
70 LPRINT CHR$(R1);CHR$(R2);
80 NEXT N
90 LPRINT
100 NEXT I
110 DATA 42, 64, 73, 65, 92, 64, 42, 64, 73, 65, 92, 64, 42, 64, 73, 65
120 LPRINT
```

- The image is printed 25 times as shown in Figure 4−9.
- An entire dot row is plotted in one printing pass. Consequently, the first row of all 25 images is printed in one pass, followed by the second row, etc, until all rows have been printed.

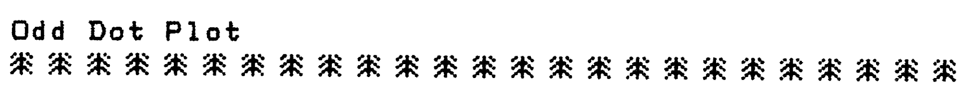


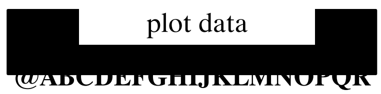
Figure 4−9. Sample Odd Dot Plot

Table 4–1. Plot Data Byte Dot Patterns

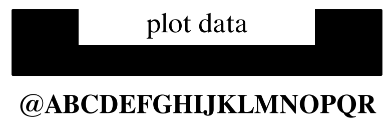
BINARY	OCT	DEC	HEX	ASCII	2 4 6 8 10 12 1 3 5 7 9 11	BINARY	OCT	DEC	HEX	ASCII	2 4 6 8 10 12 1 3 5 7 9 11	BINARY	OCT	DEC	HEX	ASCII	2 4 6 8 10 12 1 3 5 7 9 11
0100000	040	32	20	Space	○○○○○●	1000000	100	64	40	@	○○○○○○	1100000	140	96	60	‘	○○○○○●
0100001	041	33	21	!	●○○○○●	1000001	101	65	41	A	●○○○○○	1100001	141	97	61	a	●○○○○●
0100010	042	34	22	”	○●○○○●	1000010	102	66	42	B	○●○○○○	1100010	142	98	62	b	○●○○○●
0100011	043	35	23	#	●●○○○●	1000011	103	67	43	C	●●○○○○	1100011	143	99	63	c	●●○○○●
0100100	044	36	24	$	○○●○○●	1000100	104	68	44	D	○○●○○○	1100100	144	100	64	d	○○●○○●
0100101	045	37	25	%	●○●○○●	1000101	105	69	45	E	●○●○○○	1100101	145	101	65	e	●○●○○●
0100110	046	38	26	&	○●●○○●	1000110	106	70	46	F	○●●○○○	1100110	146	102	66	f	○●●○○●
0100111	047	39	27	’	●●●○○●	1000111	107	71	47	G	●●●○○○	1100111	147	103	67	g	●●●○○●
0101000	050	40	28	(	○○○●○●	1001000	110	72	48	H	○○○●○○	1101000	150	104	68	h	○○○●○●
0101001	051	41	29	)	●○○●○●	1001001	111	73	49	I	●○○●○○	1101001	151	105	69	i	●○○●○●
0101010	052	42	2A	*	○●○●○●	1001010	112	74	4A	J	○●○●○○	1101010	152	106	6A	j	○●○●○●
0101011	053	43	2B	+	●●○●○●	1001011	113	75	4B	K	●●○●○○	1101011	153	107	6B	k	●●○●○●
0101100	054	44	2C	,	○○●●○●	1001100	114	76	4C	L	○○●●○○	1101100	154	108	6C	l	○○●●○●
0101101	055	45	2D	–	●○●●○●	1001101	115	77	4D	M	●○●●○○	1101101	155	109	6D	m	●○●●○●
0101110	056	46	2E	.	○●●●○●	1001110	116	78	4E	N	○●●●○○	1101110	156	110	6E	n	○●●●○●
0101111	057	47	2F	/	●●●●○●	1001111	117	79	4F	O	●●●●○○	1101111	157	111	6F	o	●●●●○●
0110000	060	48	30	0	○○○○●●	1010000	120	80	50	P	○○○○●○	1110000	160	112	70	p	○○○○●●
0110001	061	49	31	1	●○○○●●	1010001	121	81	51	Q	●○○○●○	1110001	161	113	71	q	●○○○●●
0110010	062	50	32	2	○●○○●●	1010010	122	82	52	R	○●○○●○	1110010	162	114	72	r	○●○○●●
0110011	063	51	33	3	●●○○●●	1010011	123	83	53	S	●●○○●○	1110011	163	115	73	s	●●○○●●
0110100	064	52	34	4	○○●○●●	1010100	124	84	54	T	○○●○●○	1110100	164	116	74	t	○○●○●●
0110101	065	53	35	5	●○●○●●	1010101	125	85	55	U	●○●○●○	1110101	165	117	75	u	●○●○●●
0110110	066	54	36	6	○●●○●●	1010110	126	86	56	V	○●●○●○	1110110	166	118	76	v	○●●○●●
0110111	067	55	37	7	●●●○●●	1010111	127	87	57	W	●●●○●○	1110111	167	119	77	w	●●●○●●
0111000	070	56	38	8	○○○●●●	1011000	130	88	58	X	○○○●●○	1111000	170	120	78	x	○○○●●●
0111001	071	57	39	9	●○○●●●	1011001	131	89	59	Y	●○○●●○	1111001	171	121	79	y	●○○●●●
0111010	072	58	3A	:	○●○●●●	1011010	132	90	5A	Z	○●○●●○	1111010	172	122	7A	z	○●○●●●
0111011	073	59	3B	;	●●○●●●	1011011	133	91	5B	[	●●○●●○	1111011	173	123	7B	{	●●○●●●
0111100	074	60	3C	<	○○●●●●	1011100	134	92	5C	\	○○●●●○	1111100	174	124	7C			○○●●●●
0111101	075	61	3D	=	●○●●●●	1011101	135	93	5D	]	●○●●●○	1111101	175	125	7D	}	●○●●●●
0111110	076	62	3E	>	○●●●●●	1011110	136	94	5E	∧	○●●●●○	1111110	176	126	7E	~	○●●●●●
0111111	077	63	3F	?	●●●●●●	1011111	137	95	5F	—	●●●●●○	1111111	177	127	7F	Delete	●●●●●●

To Exit the P–Series Plot Mode

When returning to the print mode from the P–Series Plot Mode, an extra line feed should be included in the data stream to maintain proper print line registration relative to the last line of plot graphics. If the extra line feed is not included, the first character line after the graphics data may be truncated, as shown in Figure 4–10.



In this example, a text line follows plot data, preceded by a single line terminator code. (Text characters extend into the range of the previously printed plot line and appear truncated.)



This example shows a text line following plot data, but preceded by an *additional* line terminator code. (Characters are able to be printed full–height.)

Figure 4–10. Truncated Character Line

Combining Graphics and Text

The printer can combine Serial Matrix bit image graphics and characters (text) on the same line. P–Series graphics and printable symbols cannot be intermixed on the same line.

CHAPTER 5

VERTICAL FORMAT UNITS

Introduction

The P9012 printer includes four vertical format units: 1) *Printronix* standard Electronic Vertical Format Unit (EVFU), 2) Dataproducts Direct Access Vertical Format Unit (DVFU), 3) Direct Access Vertical Format Unit (NVFU), and 4) Centronics Direct Access Vertical Format Unit (CVFU). Although not a "true" VFU, a vertical tab table is provided for forms control in Serial Matrix protocol. All VFUs are available only in P−Series protocol and are enabled from the control panel, and the Serial Matrix vertical tabs feature is always enabled in Serial Matrix protocol. This chapter describes:

- General VFU Programming
- EVFU
- DVFU
- NVFU
- CVFU
- Serial Matrix Vertical Formatting

General VFU Programming

A vertical format unit provides an efficient way to slew paper rapidly during repetitive printing tasks. The type of VFU used is a configuration option selected from the control panel. If not used, the VFU option should be disabled from the control panel.

The general VFU programming procedure is as follows:

1. Design a form, determining spacing and channel assignments for each line.
2. Send the programming sequence to the host. The sequence depends on the type of VFU used.

Some VFUs require the PI line normally associated with the Dataproducts parallel interface. Note that data bit 8 of the standard RS−232 interface can be configured for use as the PI line.

The following information applies when programming and using a Vertical Format Unit:

Elongated Characters − Elongated (double high) characters can be used within VFU programs. The VFU automatically counts one line of elongated characters as two normal character lines.

Paper Runaway Protection − If the VFU is selected but not loaded when a VFU command is sent from the host computer, the printer will move the paper a single line feed. If the VFU is selected and the memory has been loaded, a channel code sent from the host, which is not a part of the assigned sequence currently in memory, will move the paper a single line feed.

Line Spacing − The printer can use any line spacing with the VFU. The VFU determines the forms length according to the program specifications and the currently selected line spacing.

Line spacing may be mixed on the same form, but should be done with caution to avoid unpredictable results.

VFU Deselected – If any VFU is deselected from the control panel, the VFU data is ignored and the forms length definition returns to the previously set value. The current print position becomes the top–of–form.

VFU Load/Save/Clear

One VFU table can be saved in Non–Volatile Memory (NVM) at a time. The VFU table format is: VFU type, LPI, and VFU channel data.

Load – Upon printer powerup or printer reset, a previously saved VFU will be loaded if the saved *VFU table* matches the *VFU type* (see page 3–18). Upon loading the VFU, LPI will be set to the value stored in the VFU table if the saved VFU was loaded using the 6 or 8 lpi DVFU or NVFU Start Load code.

Save – From the control panel, VFU TABLE SAVE writes the current VFU table into Non–Volatile memory. Skip–over perforation and forms length values are not saved from this selection.

Clear – The VFU can be cleared by pressing ENTER at the VFU TABLE CLEAR configuration menu, control code (SFCC @), changing printer protocol, changing VFUs, loading parameters, or by loading a new VFU format. When DISABLE is selected as the VFU type, the previously loaded VFU data is *not* cleared and will still be in effect if reselected.

P–Series EVFU

The EVFU may be selected in P–Series protocol. The EVFU provides 16 channels to identify up to 192 lines. The programming sequence is 1) start load code; 2) line identification code; and 3) end load code.

Start Load Code – 1E or 6E Hex

The start load code clears and initializes the EVFU memory for the memory load program. The start load code is 1E hex when the PI line is disabled (low) or 6E hex when the PI line is enabled (high).

Channel Assignment

The EVFU memory has the capacity for 192–line forms. The first line identification code (channel code) in the memory load program defines the first line on the form; the second line identification code defines the second line on the form, etc. Each line must have a line identification code. Filler channel codes are used for lines that will not be accessed by the print program. Any channel code can be used as a filler except channel code 1, which is reserved for the top–of–form, and channel code 12, which is reserved as the vertical tab channel. The same filler channel code can be repeated as necessary for any number of lines.

Channel 1 − The top−of−form code, reserved as the first line on the form or the first line printed (top−of−form position). The operating program sends the channel 1 code to advance to the top of the next form. After the memory is loaded, a Form Feed code (FF, 0C hex) will move the paper tothe next channel 1 (top−of−form).

Channels 2 through 11, 13 and 14 − Used as general channel codes (line identification codes) or filler channels. Each line on the form must be identified by a channel code. When the operating program sends the channel code, the paper advances to the line identified by the channel code. Lines not used by the operating program must be identified by filler channels (unused channel codes).

Channel 12 − Reserved as the Vertical Tab channel. The Vertical Tab code (VT, 0B hex) prints any data in the print buffer and rapidly slews the paper to the next line identified by the channel 12 code. If channel 12 is not loaded in the EVFU memory, a single line feed will be executed when a VT code is sent.

Channel 15 and 16 − Used as general channel codes or filler channels only when the VFU is accessed by the PI line. In an EVFU form that does not use the PI line, the codes for Channels 15 and 16 function as the Start Load and End Load codes.

End Load − 1F or 6F Hex

The end load code terminates the memory load program. The end load code is 1F hex when the PI line is disabled (low) or 6F hex when the PI line is high. Channel codes in excess of 192 channels received prior to the end load code are discarded.

Using the EVFU

Once the EVFU program has been enabled and loaded, the VFU LOADED indicator on the control panel lights. Sending the appropriate channel code to the printer will cause any data in the buffer to print and slew the paper to the next line on the form having the specified channel number assigned in EVFU memory.

For a data byte to be recognized as an EVFU instruction, the following criteria must be met:

1. PI line must be enabled and set high; and

2. Data bit 5 must be 0 (not set).

OR:

1. PI line must be disabled or low; and

2. Data bit 5 must be 1 (set).

Given these conditions, the lower four bits of a byte will specify the EVFU channel number. Table 5−1 lists the EVFU channels and their equivalent data bytes with the PI line enabled; Table 5−2 lists the EVFU channel and their equivalent data bytes with the PI line disabled.

Table 5−1. P−Series EVFU Codes − PI Line Enabled

ASCII			Data Bits									Channel
Hex	**Dec**	**Code**	**PI**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
00	0	NUL	1	X	X	X	0	0	0	0	0	1 (TOF)
01	1	SOH	1	X	X	X	0	0	0	0	1	2
02	2	STX	1	X	X	X	0	0	0	1	0	3
03	3	ETX	1	X	X	X	0	0	0	1	1	4
04	4	EOT	1	X	X	X	0	0	1	0	0	5
05	5	ENQ	1	X	X	X	0	0	1	0	1	6
06	6	ACK	1	X	X	X	0	0	1	1	0	7
07	7	BEL	1	X	X	X	0	0	1	1	1	8
08	8	BS	1	X	X	X	0	1	0	0	0	9
09	9	HT	1	X	X	X	0	1	0	0	1	10
0A	10	LF	1	X	X	X	0	1	0	1	0	11
0B	11	VT	1	X	X	X	0	1	0	1	1	12 (VT)
0C	12	FF	1	X	X	X	0	1	1	0	0	13
0D	13	CR	1	X	X	X	0	1	1	0	1	14
0E	14	SO	1	X	0	0	0	1	1	1	0	15
0F	15	SI	1	X	0	0	0	1	1	1	1	16
6E	110	n	1	X	1	1	0	1	1	1	0	Start Load
6F	111	o	1	X	1	1	0	1	1	1	1	End Load
X = Undefined, 0 or 1						1 = High						0 = Low

NOTE: Disabling or enabling the PI interface line is configuration controlled.

Table 5−2. P−Series EVFU Codes − PI Line Disabled or Not Used

ASCII			Data Bits								Channel
Hex	**Dec**	**Code**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
10	16	DLE	0	0	0	1	0	0	0	0	1 (TOF)
11	17	DC1	0	0	0	1	0	0	0	1	2
12	18	DC2	0	0	0	1	0	0	1	0	3
13	19	DC3	0	0	0	1	0	0	1	1	4
14	20	DC4	0	0	0	1	0	1	0	0	5
15	21	NAK	0	0	0	1	0	1	0	1	6
16	22	SYN	0	0	0	1	0	1	1	0	7
17	23	ETB	0	0	0	1	0	1	1	1	8
18	24	CAN	0	0	0	1	1	0	0	0	9
19	25	EM	0	0	0	1	1	0	0	1	10
1A	26	SUB	0	0	0	1	1	0	1	0	11
1B	27	ESC	0	0	0	1	1	0	1	1	12 (VT)
1C	28	FS	0	0	0	1	1	1	0	0	13
1D	29	GS	0	0	0	1	1	1	0	1	14
1E	30	RS	0	0	0	1	1	1	1	0	Start Load
1F	31	US	0	0	0	1	1	1	1	1	End Load
X = Undefined, 0 or 1					1 = High						0 = Low

NOTE: The ESC code cannot be used simultaneously as the EVFU VT code and the Special Function Control Character (SFCC). If ESC is used as the SFCC, the EVFU must be used with the PI line enabled and set high. Refer to the Configuration chapter for more information on the SFCC.

Clearing the EVFU Memory

The following actions will reset (clear) the EVFU memory:

1. Sending only the start load code.
2. Sending a start load code followed immediately by an end load code.
3. A second start load code is received, resulting in reinitialization of the EVFU. (This allows the host data to be restarted.)

When the EVFU memory is cleared, the forms length returns to the previously set value and the current print position becomes the top−of−form (TOF).

Relative Line Slewing

Another method of moving paper using the PI line results in vertical slews of a specified number of lines within the form relative to the current print line (rather than slewing to a specific line). For this to occur, three criteria must be met:

1. The PI line must be enabled and set high;

2. Data bit 5 must be 1 (set); and

3. The EVFU must be the selected Vertical Format Unit.

The Slew Relative configuration and the status of data bits 1–4 determine the number of lines slewed as described in Table 5–3. (Note that the state of data bit 5 is the difference between line slewing and using the interface lines as EVFU channel codes.) As long as the EVFU is selected, this type of vertical paper motion will occur regardless of whether the EVFU memory is loaded or not.

If the Double High for One Line attribute is active, n + 1 lines will be slewed rather than n lines.

Table 5–3. P–Series EVFU Line Slewing

ASCII			Data Bits									Lines Slewed
Hex	**Dec**	**Code**	**PI**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
10	16	DLE	1	X	X	X	1	0	0	0	0	1
11	17	DC1	1	X	X	X	1	0	0	0	1	2
12	18	DC2	1	X	X	X	1	0	0	1	0	3
13	19	DC3	1	X	X	X	1	0	0	1	1	4
14	20	DC4	1	X	X	X	1	0	1	0	0	5
15	21	NAK	1	X	X	X	1	0	1	0	1	6
16	22	SYN	1	X	X	X	1	0	1	1	0	7
17	23	ETB	1	X	X	X	1	0	1	1	1	8
18	24	CAN	1	X	X	X	1	1	0	0	0	9
19	25	EM	1	X	X	X	1	1	0	0	1	10
1A	26	SUB	1	X	X	X	1	1	0	1	0	11
1B	27	ESC	1	X	X	X	1	1	0	1	1	12
1C	28	FS	1	X	X	X	1	1	1	0	0	13
1D	29	GS	1	X	X	X	1	1	1	0	1	14
1E	30	RS	1	X	0	0	1	1	1	1	0	15
1F	31	US	1	X	0	0	1	1	1	1	1	16
X = Undefined, 0 or 1						1 = High						0 = Low

DVFU

The DVFU may be selected in P–Series protocol and is generally used in conjunction with the Dataproducts interface. A maximum of 12 channels can be assigned to each physical line of a form––up to 143 lines. A channel number is assigned to each line on the form. Channel codes are then sent by the host computer to the printer resulting in rapid paper slewing to the next corresponding line. The programming sequence is 1) start load code; 2) channel assignments; and 3) end load code.

The DVFU start load codes are either 6C, 6D, or 6E hex *with* the Paper Instruction (PI) Line high.

Start Load Code − 6C, 6D, or 6E Hex

6E Hex − The DVFU start load code of 6E (hex) with the PI line high initiates the DVFU memory load routine using the current printer line spacing as the DVFU line spacing.

6C Hex − The DVFU start load code of 6C (hex) with the PI line high initiates the DVFU memory load routine using 6 lpi as the line spacing regardless of the current printer line spacing.

6D Hex − The DVFU start load code of 6D (hex) with the PI line high initiates the DVFU memory load routine using 8 lpi as the line spacing regardless of the current printer line spacing.

Channel Assignment

Following the start load code, all data bytes received are interpreted as channel assignment data until the end load code is received. During the channel assignment portion of the load routine, the PI line can be high or low; if high, however, the channel data must *not* be the same as start or end load code data. The last channel 12 loaded is assigned Bottom of Form (BOF). If skip−over perforation is enabled, slewing will occur from BOF to TOF.

A maximum of 12 channels can be assigned to one physical line on the form (multiple channels per line facilitate the use of a single DVFU load for multiple forms). Two eight−bit data bytes (DVFU characters) are required per line. As shown in Table 5−4, the least significant 6 bits of the first data byte are used to assign channels 1 through 6; the least significant 6 bits of the second data byte are used to assign channels 7 through 12. If a bit is set, the corresponding channel is assigned.

Each line on the form requires two bytes. For lines not requiring a channel identification, the two bytes should not contain channel assignments.

A maximum of 143 lines (286 DVFU bytes) can be assigned on the form. If more than 286 bytes are received without an end load code, the end load code is "forced" and the load routine is terminated.

CH 1 TOF − The first channel, line 1 of the form, *must* be assigned channel 1, top−of−form, or the entire load sequence is ignored and the memory reset. Consequently, when preparing to load the DVFU memory, position the paper at the required top−of−form position in anticipation of sending the TOF channel assignment code as the first line loaded. After the memory is loaded, a Form Feed code (FF, 0C hex) will move the paper tothe next channel 1 (top−of−form).

CH 2 VT − Channel 2 is designated as the vertical tab channel. After the memory is loaded, a VT code (0B hex) will move the paper to the next channel 2. If a VT code is received but channel 2 is not loaded, the paper will advance a single line at the current line spacing.

CH 12 BOF − The last channel 12 loaded is used as the bottom−of−form channel and has significance when using the printer skip−over perforation feature. When skip−over perforation is enabled, paper will skip from BOF to TOF *only* if at the BOF position. If a channel search moves paper past the BOF position but before the TOF position, no skip−over perforation will occur.

Table 5–4. DVFU Channel Assignment

Binary Value	First Data Byte Bit #	Channel #	Binary Value	Second Data Byte Bit #	Channel #
128	8	X (don't care)	128	8	X (don't care)
64	7	X (don't care)	64	7	X (don't care)
32	6	6	32	6	12 – BOF
16	5	5	16	5	11
8	4	4	8	4	10
4	3	3	4	3	9
2	2	2 – VT	2	2	8
1	1 (LSB)	1 – TOF	1	1 (LSB)	7

End Load Code – 6F Hex

The DVFU end load code is 6F (hex) with the PI line high. This terminates the DVFU memory load routine.

Using the DVFU

The VFU LOADED indicator on the control panel lights when the DVFU program has been enabled and loaded. Sending an appropriate channel code to the printer will cause any data in the buffer to print and slew the paper to the next line on the form having the specified channel number assigned in DVFU memory. For a data byte to be recognized as a DVFU channel instruction, the following criteria must be met:

1. PI line must be enabled and set high; and
2. Data bit 5 must be 0 (not set).

Given these conditions, the lower 4 bits of a byte will specify the DVFU channel number. Table 5–5 lists DVFU channels and their equivalent data bytes.

Clearing the DVFU Memory

The following actions will reset (clear) the DVFU memory.

1. Only start load and end load codes are sent (no channel assignment data).
2. An odd number of DVFU characters (channel assignment data) are sent (detected after the end load code is received). Remember, two data bytes are required per line.

Table 5–5. DVFU Channel Instruction

ASCII			Data Bits									Channel
Hex	**Dec**	**Code**	**PI**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
00	0	NUL	1	X	X	X	0	0	0	0	0	1
01	1	SOH	1	X	X	X	0	0	0	0	1	2
02	2	STX	1	X	X	X	0	0	0	1	0	3
03	3	ETX	1	X	X	X	0	0	0	1	1	4
04	4	EOT	1	X	X	X	0	0	1	0	0	5
05	5	ENQ	1	X	X	X	0	0	1	0	1	6
06	6	ACK	1	X	X	X	0	0	1	1	0	7
07	7	BEL	1	X	X	X	0	0	1	1	1	8
08	8	BS	1	X	X	X	0	1	0	0	0	9
09	9	HT	1	X	X	X	0	1	0	0	1	10
0A	10	LF	1	X	X	X	0	1	0	1	0	11
0B	11	VT	1	X	X	X	0	1	0	1	1	12
X = Undefined, 0 or 1						1 = High						0 = Low

3. A second start load code is received, resulting in reinitialization of the DVFU. This allows the host data to be restarted.

4. The first byte sent after the start load does not specify top–of–form.

The DVFU data is ignored if the DVFU has not been selected from the control panel. Deselecting the DVFU returns the forms length to the previously set value and the current print position becomes the top–of–form (TOF).

Relative Line Slewing

Another method of moving paper using the PI line results in vertical slews of a specified number of lines within the form relative to the current print line (rather than slewing to a specific line). For this to occur, three criteria must be met:

1. PI line must be set high;

2. Data bit 5 must be 1 (set); and

3. The DVFU must be the selected Vertical Format Unit.

The Slew Relative configuration and the status of data bits 1–4 determine the number of lines slewed as described in Table 5–6. (Note that the state of data bit 5 is the difference between line slewing and using the interface lines as DVFU channel codes.) As long as the DVFU is selected, this type of vertical paper motion will occur regardless of whether the DVFU memory is loaded or not.

If the Double High for One Line attribute is active, n + 1 lines will be slewed rather than n lines.

Table 5−6. P−Series DVFU Line Slewing

ASCII				Data Bits								Lines Slewed
Hex	**Dec**	**Code**	**PI**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
10	16	DLE	1	X	X	X	1	0	0	0	0	0 = CR*
11	17	DC1	1	X	X	X	1	0	0	0	1	1
12	18	DC2	1	X	X	X	1	0	0	1	0	2
13	19	DC3	1	X	X	X	1	0	0	1	1	3
14	20	DC4	1	X	X	X	1	0	1	0	0	4
15	21	NAK	1	X	X	X	1	0	1	0	1	5
16	22	SYN	1	X	X	X	1	0	1	1	0	6
17	23	ETB	1	X	X	X	1	0	1	1	1	7
18	24	CAN	1	X	X	X	1	1	0	0	0	8
19	25	EM	1	X	X	X	1	1	0	0	1	9
1A	26	SUB	1	X	X	X	1	1	0	1	0	10
1B	27	ESC	1	X	X	X	1	1	0	1	1	11
1C	28	FS	1	X	X	X	1	1	1	0	0	12
1D	29	GS	1	X	X	X	1	1	1	0	1	13
1E	30	RS	1	X	0	0	1	1	1	1	0	14
1F	31	US	1	X	0	0	1	1	1	1	1	15
X = Undefined, 0 or 1						1 = High						0 = Low
**treated as CR = CR; refer to the Carriage Return control code on page 6−16.*												

NVFU

The NVFU may be selected in P−Series protocol. A maximum of 13 channels can be assigned to a form up to 256 lines. A channel number is assigned to each line on the form. Channel codes are then sent by the host computer to the printer resulting in rapid paper slewing to the next corresponding line. The programming sequence is 1) start load code; 2) LPI byte; 3) channel assignments; and 4) end load code.

Start Load Code − 6D Hex

The NVFU start load code is 6D hex *with* the Paper Instruction (PI) Line high. After the LPI byte, subsequent data received is channel assignment data until the end load code is received.

LPI Byte

The first byte received after the start load code must be the Lines Per Inch, LPI byte, not a channel assignment byte. Bit 5 of the LPI byte determines the line spacing for the form. If bit 5 of the LPI byte is high (1), line spacing is set to 8 lpi; otherwise, the line spacing is set to 6 lpi. The channel number of the LPI byte is ignored (it is not a channel assignment byte), but the byte is counted as one of the total line bytes.

Channel Assignment

The NVFU memory has the capacity for 256−line forms. The first line identification code (channel code) in the memory load program defines the first line on the form; the second line identification code defines the second line on the form, etc. Each line must have a line identification code. Filler channel codes are used for lines that will not be accessed by the print program. The same filler channel code can be repeated as necessary for any number of lines. Table 5−7 illustrates the channel codes and load sequence.

Setting bit 5 of a channel assignment code will result in all channel assignment codes after this code being ignored until an end load code is received. The channel assignment code with bit 5 set is accepted as the last line of the form.

The top−of−form position is designated by channel 1. The first line of the form is automatically designated as a top−of−form. When the load sequence is received, the paper is assumed to be at the proper top−of−form position. After the memory is loaded, a Form Feed code (FF, 0C hex) will move the paper tothe next channel 1 (top−of−form).

End Load − 6F Hex

The end load code terminates the memory load program. The end load code is 6F hex with the PI line high.

Table 5−7. NVFU Channel Codes

ASCII			Data Bits									Channel
Hex	Dec	Code	PI	8	7	6	5	4	3	2	1	
60	96	`	0	X	1	1	0	0	0	0	0	1 (TOF)
61	97	a	0	X	1	1	0	0	0	0	1	2 (VT)
62	98	b	0	X	1	1	0	0	0	1	0	3
63	99	c	0	X	1	1	0	0	0	1	1	4
64	100	d	0	X	1	1	0	0	1	0	0	5
65	101	e	0	X	1	1	0	0	1	0	1	6
66	102	f	0	X	1	1	0	0	1	1	0	7
67	103	g	0	X	1	1	0	0	1	1	1	8
68	104	h	0	X	1	1	0	1	0	0	0	9
69	105	i	0	X	1	1	0	1	0	0	1	10
6A	106	j	0	X	1	1	0	1	0	1	0	11
6B	107	k	0	X	1	1	0	1	0	1	1	12
6C	108	l	0	X	1	1	0	1	1	0	0	13
6E	110	n	1	X	1	1	0	1	1	1	0	Start Load
6F	111	o	1	X	1	1	0	1	1	1	1	End Load
			0	X	1	1	N	X	X	X	X	LPI Byte N=0=6 lpi N=1=8 lpi
X = Undefined, 0 or 1					1 = High							0 = Low

Using the NVFU

The VFU LOADED indicator on the control panel lights when the NVFU program has been enabled and loaded. Sending an appropriate channel code to the printer will cause any data in the buffer to print and slew the paper to the next line on the form having the specified channel number assigned in NVFU memory. For a data byte to be recognized as a NVFU channel instruction, the following criteria must be met:

1. PI line must be enabled and set high; and
2. Data bit 5 must be 0 (not set).

Given these conditions, the lower 4 bits of a byte will specify the NVFU channel number. Table 5−8 lists NVFU channels and their equivalent data bytes.

Clearing the NVFU Memory

The following actions will reset (clear) the NVFU memory.

1. Only the start load code sent.
2. Sending a start load code followed immediately by an end load code.
3. A second start load code is received, resulting in reinitialization of the NVFU. (This allows the host data to be restarted.)

When the NVFU memory is cleared, the forms length returns to the previously set value and the current print position becomes the top−of−form (TOF).

Table 5−8. NVFU Command Codes

ASCII			Data Bits									NVFU Channel
Hex	**Dec**	**Code**	**PI**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
00	0	NUL	1	X	X	X	0	0	0	0	0	1 (TOF)
01	1	SOH	1	X	X	X	0	0	0	0	1	2
02	2	STX	1	X	X	X	0	0	0	1	0	3
03	3	ETX	1	X	X	X	0	0	0	1	1	4
04	4	EOT	1	X	X	X	0	0	1	0	0	5
05	5	ENQ	1	X	X	X	0	0	1	0	1	6
06	6	ACK	1	X	X	X	0	0	1	1	0	7
07	7	BEL	1	X	X	X	0	0	1	1	1	8
08	8	BS	1	X	X	X	0	1	0	0	0	9
09	9	HT	1	X	X	X	0	1	0	0	1	10
0A	10	LF	1	X	X	X	0	1	0	1	0	11
0B	11	VT	1	X	X	X	0	1	0	1	1	12
0C	12	FF	1	X	X	X	0	1	1	0	0	13
X = Undefined, 0 or 1						1 = High						0 = Low

Relative Line Slewing

Another method of moving paper using the PI line results in vertical slews of a specified number of lines within the form relative to the current print line (rather than slewing to a specific line). For this to occur, three criteria must be met:

1. PI line must be set high;
2. Data bit 5 must be 1 (set); and
3. The NVFU must be the selected Vertical Format Unit.

The Slew Relative configuration and the status of data bits 7−6 and 1−4 determine the number of lines slewed as described in Table 5−9. (Note that the state of data bit 5 is the difference between line slewing and using the interface lines as NVFU channel codes.) As long as the NVFU is selected, this type of vertical paper motion will occur regardless of whether the NVFU memory is loaded or not.

If the Double High for One Line attribute is active, n + 1 lines will be slewed rather than n lines.

Table 5−9. NVFU Line Slewing

	Bits of Data Byte								
PI Line	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
1	X	0	0	1	0	0	0	0	Perform a CR function *
1	X	n6	n5	1	n4	n3	n2	n1	Slew 1 − 63 lines

X = don't care (1 or 0)
n1 − n6 = decoded for 1 to 63 line movement

**treated as CR = CR; refer to the Carriage Return control code on page 6−16.*

CVFU

The CVFU may be selected in P−Series protocol. The CVFU provides 12 channels to identify up to 126 lines, responding to Centronics Direct Access Format Unit control codes. This VFU does not make use of the PI line for either loading or executing. The programming sequence is 1) start load code; 2) line identification code; and 3) end load code.

Start Load Code − 1D Hex

The start load code clears and initializes the CVFU memory for the memory load program. The start load code is 1D hex. Subsequent data received after the start load code are interpreted as line identification codes until the end load code is received.

Channel Assignment

Following the start load code, all data bytes received are interpreted as channel assignment data until the end load code is received.

A maximum of 12 channels can be assigned to one physical line on the form. Two eight−bit data bytes (CVFU characters) are required per line. As shown in Table 5−10, the least significant 6 bits of the first data byte are used to assign channels 1 through 6; the least significant 6 bits of the second data byte are used to assign channels 7 through 12. If a bit is set, the corresponding channel is assigned.

Each line on the form requires two bytes. For lines not requiring a channel identification, the two bytes should not contain channel assignments.

This procedure can be continued for a maximum of 126 lines (252 CVFU bytes). The CVFU memory is cleared if more than 252 bytes are received before the end load code.

CH 1 TOF − The first channel, line 1 of the form, *must* be assigned channel 1, top−of−form and Channel 2 *must not* be defined in this first byte (byte one, bit 2 must be 0) or the entire load sequence is ignored and the memory reset. After the memory is loaded, a Form Feed code (FF, 0C hex) will move the paper tothe next channel 1 (top−of−form).

After the channel assignment on the last line of the form, another channel assignment code must be sent with the top−of−form bit set (called the “dummy TOF”). This channel assignment code does not count as a line of the form. All data received after the dummy TOF will be ignored until the end load code is received. Data received after the the dummy TOF is counted as part of the maximum allowed (126 lines, 252 bytes).

CH 2 VT − Channel 2 is used as the vertical tab channel. After the memory is loaded, a VT code (0B hex) will move the paper to the next channel 2. If a VT code is received but channel 2 is not loaded, the paper will advance to the next TOF position. If a VT code is received but the CVFU is not selected or not loaded, a s8
ingle line feed occurs.

End Load Code − 1E Hex

The CVFU end load code is 1E hex. This terminates the CVFU memory load routine.

Table 5−10. CVFU Channel Assignment

Binary Value	FIRST DATA BYTE Bit #	Channel #	Binary Value	SECOND DATA BYTE Bit #	Channel #
128	8	X (don’t care)	128	8	X (don’t care)
64	7	set high (1)	64	7	set high (1)
32	6	6	32	6	12
16	5	5	16	5	11
8	4	4	8	4	10
4	3	3	4	3	9
2	2	2 − VT	2	2	8
1	1 (LSB)	1 − TOF	1	1 (LSB)	7

Using the CVFU − 1F Hex

The VFU LOADED indicator on the control panel lights when the CVFU program has been enabled and loaded. Sending an appropriate channel code to the printer will cause any data in the buffer to print and slew the paper to the next line on the form having the specified channel number assigned in CVFU memory. For a data byte to be recognized as a CVFU channel instruction, the following criteria must be met:

1. A 1F hex code must have been received; and
2. Data bit 5 must be 0 (not set).

Given these conditions, the lower 4 bits of a byte will specify the CVFU channel number. Table 5−11 lists CVFU channels and their equivalent data bytes.

Table 5−11. CVFU Command Codes

ASCII			Data Bits								CVFU Channel
Hex	**Dec**	**Code**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
1F	31	US	X	X	X	1	1	1	1	1	Start Execute
01	1	SOH	X	X	X	0	0	0	0	1	1
02	2	STX	X	X	X	0	0	0	1	0	2
03	3	ETX	X	X	X	0	0	0	1	1	3
04	4	EOT	X	X	X	0	0	1	0	0	4
05	5	ENQ	X	X	X	0	0	1	0	1	5
06	6	ACK	X	X	X	0	0	1	1	0	6
07	7	BEL	X	X	X	0	0	1	1	1	7
08	8	BS	X	X	X	0	1	0	0	0	8
09	9	HT	X	X	X	0	1	0	0	1	9
0A	10	LF	X	X	X	0	1	0	1	0	10
0B	11	VT	X	X	X	0	1	0	1	1	11
0C	12	FF	X	X	X	0	1	1	0	0	12
X = Undefined, 0 or 1					1 = High						0 = Low

Clearing the CVFU Memory

The following actions will reset (clear) the CVFU memory.

1. Only the start load and end load codes are sent (no channel data).
2. An odd number of CVFU characters (channel assignment data) are sent (detected after the end load code is received). Remember, two data bytes are required per line.
3. More than 126 lines (252 bytes) are sent without specifying the dummy TOF.
4. The first byte sent after the start load does not specify TOF or channel 2 is specified in the first byte.

5. Bit 7 is low during the CVFU load.

6. A second start load code is received, resulting in reinitialization of the NVFU. (This allows the host data to be restarted.)

When the CVFU memory is cleared, the forms length returns to the previously set value and the current print position becomes the top−of−form (TOF).

Relative Line Slewing

Another method of moving paper using the PI line results in vertical slews of a specified number of lines within the form relative to the current print line (rather than slewing to a specific line). For this to occur, three criteria must be met:

1. A 1F hex code must have been received;

2. Data bit 5 must be 1 (set); and

3. The CVFU must be the selected Vertical Format Unit.

The Slew Relative configuration and the status of data bits 1−4 determine the number of lines slewed as described in Table 5−12. (Note that the state of data bit 5 is the difference between line slewing and using the interface lines as CVFU channel codes.) As long as the CVFU is selected, this type of vertical paper motion will occur regardless of whether the CVFU memory is loaded or not.

If the Double High for One Line attribute is active, n + 1 lines will be slewed rather than n lines.

Table 5−12. CVFU Line Slewing

ASCII			Data Bits								Lines Slewed
Hex	**Dec**	**Code**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
10	16	DLE	0	0	0	1	0	0	0	0	0 = CR*
11	17	DC1	0	0	0	1	0	0	0	1	1
12	18	DC2	0	0	0	1	0	0	1	0	2
13	19	DC3	0	0	0	1	0	0	1	1	3
14	20	DC4	0	0	0	1	0	1	0	0	4
15	21	NAK	0	0	0	1	0	1	0	1	5
16	22	SYN	0	0	0	1	0	1	1	0	6
17	23	ETB	0	0	0	1	0	1	1	1	7
18	24	CAN	0	0	0	1	1	0	0	0	8
19	25	EM	0	0	0	1	1	0	0	1	9
1A	26	SUB	0	0	0	1	1	0	1	0	10
1B	27	ESC	0	0	0	1	1	0	1	1	11
1C	28	FS	0	0	0	1	1	1	0	0	12
1D	29	GS	0	0	0	1	1	1	0	1	13
1E	30	RS	0	0	0	1	1	1	1	0	14
1F	31	US	0	0	0	1	1	1	1	1	15
X = Undefined, 0 or 1					1 = High						0 = Low
**treated as CR = CR; refer to the Carriage Return control code on page 6−16.*											

Serial Matrix Vertical Formatting

In Serial Matrix protocol, vertical formatting is always enabled. Forms control is accomplished by a set of programmed vertical tabs. Various lines of the form are assigned vertical tabs which are then accessed by control code for rapid paper advancement to the tab position. Two codes are used for controlling vertical tabs: ESC B for single channel tab setting, and VT to execute a vertical tab. These codes and their parameters are described in the Programming chapter. The VFU Loaded indicator on the control panel will not light when vertical tabs are loaded for forms control.

Executing Vertical Tabs

The vertical tab execute code is VT. When sent, it prints the contents of the print buffer (if data is in the buffer) and causes paper movement to the next predefined vertical tab position. If a tab position is not defined, the paper is moved to the next line at the current line spacing. If a tab position is at the current line, the paper is moved to the next tab position. If no tab positions are defined between the current line and the end of the form, the paper moves to the next top−of−form (TOF).

Vertical Tab Positions

Vertical tab positions are assigned to a line number. A maximum of 16 vertical tab positions can be assigned on the form. A sample format is shown in Figure 5−1. The first vertical tab is assigned line 6 for part number data, a second tab is assigned line 8 for part name data, and a third tab is assigned line 14 for quantity data. The ESC B code is used to assign the vertical tabs to the lines of the form. Once the tab positions are assigned, sending the vertical tab execute code (VT) causes the paper (currently at the top−of−form position) to advance to the first tab position for PART NUMBER data. Sending another VT moves the paper to the second tab position for PART NAME, followed by a third VT to access the third tab position for QUANTITY data.

Form Data	Form Line Number	Vertical Tabs
	1	Top of Form
	2	
	3	
	4	
	5	
PART NUMBER	6	Tab 1
	7	
PART NAME	8	Tab 2
	9	
	10	
	11	
	12	
	13	
QUANTITY	14	Tab 3
	15	
	↓	
	20	

Figure 5−1. Sample Serial Matrix Vertical Tab Positions

CHAPTER 6

PROGRAMMING

Introduction

The P9012 printer can be configured by from the control panel to respond to *Printronix* P−Series or Serial Matrix control codes. This dual compatibility allows the programmer to choose one of two standard protocols. If equipped with the Intelligent Graphics Processor (IGP) option, the printer will respond to the Special Function Control Character and IGP commands as described in the IGP User's Reference Manual. This chapter describes:

- Overstrike/Overlay Mode
- Control Code Functions
- Special Function Control Code Header
- Attribute Set and Reset Codes
- Control Code Reference Index
- Individual Control Code Descriptions

Overstrike/Overlay Mode

Data in the print buffer can be underlined or overstruck when the carriage return code (hex 0D) is configured for carriage return only (*not* carriage return and line feed). Any printable characters in the data stream can overstrike printable characters or spaces already loaded in the print buffer as long as a paper motion command (ie: line feed, form feed) has not been received. The printer is in the Overstrike Mode when configured from the control panel for OVERSTRIKE ENABLE. The Overstrike Mode causes the printer to double strike any dots following the carriage return that lay on top of dots placed *before* the carriage return. To make a character bold, send the character, a carriage return, and the character again.

The printer is in the Overlay Mode when configured from the control panel with OVERSTRIKE DISABLE. The Overlay Mode causes dots following the carriage return to be laid on top of existing data received before the carriage return. (No dots will be double struck.) The Overlay Mode results in faster printing because it does not have to strike dots twice; however, the Overlay Mode does not allow character bolding with the use of carriage returns. An example of overstrike/overlay and underlining characters is shown in Figure 6−1.

Enter in Print Buffer	Printed Result
`P9000 SERIES PRINTER (CR)`	
`SS/// (CR)`	
`_____ (LF)`	`P9ØØØ SERIES PRINTER` (P9ØØØ underlined)

S = Space (20 Hex)   CR = Carriage Return (0D Hex)*
LF = Line Feed (0A Hex)   _ = Underline (5F Hex)

** NOTE: The printer must be configured for CR=CR only. If configured for a carriage return plus line feed on receipt of the CR code, the contents of the buffer will be printed.*

Figure 6−1. Overstrike/Overlay and Underline Examples

Control Code Functions

The following information is listed for each code function (where applicable and possible).

ASCII Mnemonic – The standard ASCII name for the control code.

Hex Code – The code's numeric equivalent in hexadecimal.

Decimal Code – The code's numeric equivalent in decimal.

Purpose – The function(s) of the control code.

Comment – A description of exceptions or limitations to normal use.

A sample **Expression** written in BASIC programming language is provided for some control codes when a specific syntax is required to complete the program statement (ie: Bit Image modes, Download a Language, Download a Character, Horizontal Tab Set, Vertical Tab Set/Clear). The programs in this chapter were run on an IBM Personal Computer using Microsoft GW–BASIC version 3.22.

Special Function Control Code – Control Code Header

A Special Function Control Code (SFCC) is used to extend the control code protocol. The SFCC is the control code introducer (or header); it is the first input in the sequence of parameters. The general control code sequence is:

(SFCC)(parameter 1)(parameter 2)...(parameter n)

P–Series codes can use SOH, ETX, ESC, ^ ("hat") or ~ ("tilde") as control code introducers. For example, bold print can be enabled in the P–Series protocol using any of the following control code introducers:

ASCII:	SOH G	**Hex:**	01 47	**BASIC:**	CHR$(1);"G";
	ETX G		03 47		CHR$(3);"G";
	ESC G		27 47		CHR$(27);"G";
	^ G		5E 47		CHR$(94);"G";
	~ G		7E 47		CHR$(126);"G";

Serial Matrix codes use *only* ESC as the control code introducer. For example, to enable bold print in the Serial Matrix printer protocol, use the Serial Matrix SFCC and the bold print control code character G as follows:

ASCII:	ESC G	**Hex:**	1B 47	**BASIC:**	CHR$(27);"G";

The SFCC is selected from the control panel. To select the SFCC for your application, refer to the Application Compatibility diagrams in the Configuration chapter. (Most programming examples in this chapter have been created using the ESC control code introducer.)

NOTE: SFCC commands must be terminated by a semicolon (;) in a BASIC program or by text following the command string. A paper motion command directly following a special function code command may result in erroneous paper movement.

Print format, print mode, or international language selection can be controlled by a longer sequence known as a Command Line. Command Lines are "string" type commands placed between complete lines of text and affect the text which follows. The printer has six Command Lines: PMODE, OSET, PSET, LPI, LINES, and INCHES. Each of these Command Lines is discussed in this chapter under the appropriate Control Code function.

For example, when in P−Series protocol, the form length (in inches) can be set using the following command line:

SFCC INCHES;n.f

where: "n" is the whole number of inches, and "f" is the fractional increment in 0.5" increments.

When using the SFCC in a Command Line, the SFCC must be the first non−blank symbol in the line ("space," hex 20, is a blank symbol). In addition, characters following spaces (other than a valid line terminator) in a Command Line are ignored so that user comments can be included on the Command Line. The valid line terminators are Form Feed (FF), Line Feed (LF), and Carriage Return (CR); however, when used in the Command Line, these line terminators do *not* cause any paper motion. If a Command Line contains an error, the command will not be executed, and the line will truncate to include any of the following error messages:

Command Line Error Messages

Error Message	Explanation
INVALID PARAMETER	*The command received cannot be interpreted correctly, or the correct command is not followed by an expected delimiter.*
PARAMETER OUT OF BOUNDS	*A decimal parameter in the command is out of range.*
MISSING PARAMETER	*One or more necessary parameters is missing from the command.*
ILLEGAL CHARACTER IN DECIMAL PARAMETER	*A decimal parameter contains a non−numeric character, or a fractional digit is out of range.*
TOO MANY DIGITS IN DECIMAL PARAMETER	*A decimal parameter contains too many digits.*

Attribute Set and Reset Codes

Certain print attributes are set and reset (turned on or off) by using the appropriate ESC or SFCC code sequence and the numbers 1 or 0. These may be either the hexadecimal code 01 and 00, or the ASCII code for the printable symbols of decimal 1 and 0 (hexadecimal code 31 and 30, respectively). Expanded Print, Super/Subscript Print, and Underline are attributes which are set/reset in this fashion.

Control Code Reference Index

The following index lists the control codes by function and lists the ASCII mnemonic and page number. Alphabetical listings by mnemonic and function are provided in Appendix D.

NOTE: Some control code functions can be accomplished using another control code sequence or via control panel selection.

PAPER MOTION

FUNCTION	P−SERIES	SERIAL	PAGE NO.	
Form Feed		FF	FF	6−41
Line Feed		LF	LF	6−46
Line Feed n/216 Inch (1 line only)		N/A	ESC J	6−47
Vertical Tab	VT	VT	6−71	

FORMAT

FUNCTION	P−SERIES	SERIAL	PAGE NO.	
Backspace		BS	BS	6−7
Cancel		N/A	CAN	6−15
Carriage Return		CR	CR	6−16
Delete		N/A	DEL	6−30
Forms Length Set (Inches)		SFCC INCHES	ESC C NUL	6−42
Forms Length Set (Lines)		SFCC LINES	ESC C	6−43
Horizontal Tab		N/A	HT	6−44
Horizontal Tab Set		N/A	ESC D	6−45
Line Spacing 1/6 Inch (6 lpi)		SFCC 2 SFCC LPI	ESC 2	6−48
Line Spacing 1/8 Inch (8 lpi)		SFCC 0 SFCC LPI	ESC 0	6−49
Line Spacing 8 or 10.3 LPI (1 line only)		ACK SFCC f	N/A	6−50
Line Spacing 7/72 Inch		SFCC 1	ESC 1	6−51
Line Spacing n/72 Inch (as executed by ESC 2)		SFCC A	ESC A	6−52
Line Spacing n/216 Inch	SFCC 3	ESC 3	6−53	
Skip−Over Perforation		N/A	ESC N	6−65
Skip−Over Perforation Cancel		N/A	ESC O	6−66
VFU Commands (P−Series)		DLE−US	N/A	6−70
Vertical Tab Set/Clear (Serial Matrix)		N/A	ESC B	6−72

PRINT MODE

FUNCTION	P–SERIES	SERIAL	PAGE NO.
Bold Print	SFCC G	ESC G	6–13
Bold Print (1 line only)	SFCC j		6–13
Bold Print Reset	SFCC H	ESC H	6–14
Condensed Print	N/A	SI ESC SI	6–28
Condensed Print Reset	N/A	DC2	6–29
Character Pitch 10 cpi	N/A	ESC P	6–17
Character Pitch 12 cpi	N/A	ESC M ESC :	6–18
Elongated (Double High) Print (1 line)	SFCC h BS	ESC h	6–34
Emphasized Print	SFCC E	ESC E	6–35
Emphasized Print Reset	SFCC F	ESC F	6–36
Expanded (Double Wide) Print	SFCC W	ESC W	6–37
Expanded (Double Wide) Print Reset	SFCC W	ESC W DC4	6–37
Expanded (Double Wide) Print (1 line)	SFCC k	SO ESC SO	6–38
Overscoring	SFCC _	ESC _	6–54
Print Mode/Pitch Selection	SFCC X SFCC PMODE	ESC X	6–58
Superscript/Subscript Printing	SFCC S	ESC S	6–67
Superscript/Subscript Printing Reset	SFCC T	ESC T	6–68
Underline	SFCC –	ESC –	6–69

GRAPHICS

FUNCTION	P–SERIES	SERIAL	PAGE NO.
Bit Image Mode, Double Density	N/A	ESC L	6–10
Bit Image Mode, Double Density/Speed	N/A	ESC Y	6–11
Bit Image Mode, Quadruple Density	N/A	ESC Z	6–12
Bit Image Mode, Single Density	N/A	ESC K	6–9
Plot, Even Dot (High Density)	EOT SFCC d	N/A	6–55
Plot, Odd Dot (Normal Density)	ENQ SFCC e	N/A	6–56

OTHER FUNCTIONS

FUNCTION	P–SERIES	SERIAL	PAGE NO.
Bell	BEL	BEL	6–8
Character Set Select	SFCC l	ESC l	6–19
Character Set Select (Control Codes)	SFCC 7	ESC 7	6–22
Character Set Select (Printable Symbols)	SFCC 6	ESC 6	6–23

OTHER FUNCTIONS (continued)

FUNCTION	P−SERIES	SERIAL	PAGE NO.
Character Set Select (Printable Symbols)	N/A	ESC u	6−24
Character Set Select: ECMA Extended	SFCC OSET	N/A	6−27
Character Set Select: International Languages	SFCC R SFCC PSET	ESC R	6−25
Download a Language	SFCC V	ESC V	6−31
Download a Character	SFCC c	ESC c	6−33
Extended Character Set SO	ESC 4 SFCC SO SFCC n SFCC 4	6−39	
Extended Character Set Cancel	SI SFCC SI SFCC o SFCC 5	ESC 5	6−40
Printer Reset	SFCC @	ESC @	6−57
Printer Select	N/A	DC1	6−60
Printer Deselect	N/A	DC3	6−61
RibbonMinder, Enable/Disable	SOH r	ESC r	6−62
RibbonMinder, Set Job Rate	SOH r J	ESC r J	6−63
RibbonMinder, When Worn Action	SOH r A	ESC r A	6−64

Backspace

	ASCII	Hex	Decimal
P−Series/ Serial	BS	08	08

Purpose Moves the logical print head to the left one character space toward the first character column.

Comment When configured for backspace (in P−Series printer protocol), BS moves the character position indicator (the logical print head position) one character space to the left at the current character pitch setting. The code is ignored if the logical print head is positioned at the first character column. When the backspace code is received, printing speed for the print line may be reduced to half.

Example Print and backspace two character positions.

```
10 LPRINT "TTTTT";
20 LPRINT CHR$(8);CHR$(8);
30 LPRINT "=="
```

```
TTT==
```

Bell

	ASCII	Hex	Decimal
P−Series/ Serial	BEL	07	07

Purpose Sounds a buzzer/beeper.

Comment The BEL function will sound a buzzer/beeper for 0.2 seconds upon receipt of this command.

Bit Image Mode, Single Density

	ASCII	Hex	Decimal
P−Series	N/A	N/A	N/A
Serial	ESC K	1B 4B	27 75

Purpose Selects Single (Normal) Density Bit Image graphics.

Expression CHR$(27);″K″;CHR$(n1);CHR$(n2);″DATA″

where n1 + 256 n2 define the number of data bytes to follow.
DATA = ASCII characters for the dot pattern bytes.

NOTE: The DATA can be expressed in a CHR$(DATA) format with the appropriate decimal values of the ASCII characters supplied especially in cases where the dot patterns of nonprintable characters are required.

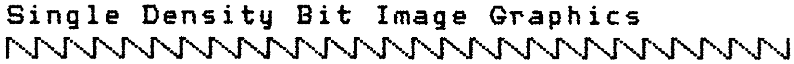
Comment For detailed information, refer to the Bit Image section in the Graphics chapter.

Example The following example produces a pattern of Single Density Bit Image graphics. The 9 data bit pattern is repeated 27 times. Compare this example to the double density and quadruple density examples.

NOTE: Depending on the host computer system, it may be necessary to include a width statement within the BASIC program.

```
10 WIDTH "lpt1:",255
20 LPRINT "Single Density Bit Image Graphics"
30 LPRINT CHR$(27);"K";CHR$(244);CHR$(0);
40 FOR N=1 TO 27
50 RESTORE
60 FOR I=1 TO 9
70 READ R
80 LPRINT CHR$(R);
90 NEXT I
100 NEXT N
110 LPRINT CHR$(255)
120 DATA 255,128,64,32,16,8,4,2,1
```

```
Single Density Bit Image Graphics
```



Bit Image Mode, Double Density

	ASCII	Hex	Decimal
P−Series	N/A	N/A	N/A
Serial	ESC L	1B 4C	27 76

Purpose Selects Double Density Bit Image graphics.

Expression CHR$(27);″L″;CHR$(n1);CHR$(n2);″DATA″

where n1 + 256 n2 define the number of data bytes to follow.
DATA = ASCII characters for the dot pattern bytes.

NOTE: The DATA can be expressed in a CHR$(DATA) format with the appropriate decimal values of the ASCII characters supplied especially in cases where the dot patterns of nonprintable characters are required.

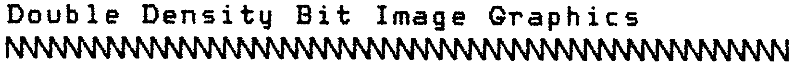
Comment Double Density printing may reduce print speed to half. For detailed information, refer to the Bit Image section in the Graphics chapter.

Example The following example produces Double Density Bit Image graphics of the pattern used in the Single Density Bit Image Mode example. Note that the amount of data must be doubled for double density (the data is used 54 times rather than 27).

NOTE: Depending on the host computer system, it may be necessary to include a width statement within the BASIC program.

```
10 WIDTH "lpt1:",255
20 LPRINT "Double Density Bit Image Graphics"
30 LPRINT CHR$(27);"L";CHR$(231);CHR$(1);
40 FOR N=1 TO 54
50 RESTORE
60 FOR I=1 TO 9
70 READ R
80 LPRINT CHR$(R);
90 NEXT I
100 NEXT N
110 LPRINT CHR$(255)
120 DATA 255,128,64,32,16,8,4,2,1
```

```
Double Density Bit Image Graphics
```



Bit Image Mode, Double Density Double Speed

	ASCII	Hex	Decimal
P–Series	N/A	N/A	N/A
Serial	ESC Y	1B 59	27 89

Purpose Prints graphics at twice the speed of Double Density (same speed as Single Density) by ignoring adjacent dots.

Expression CHR$(27);″Y″;CHR$(n1);CHR$(n2);″DATA″

where n1 + 256 n2 define the number of data bytes to follow.
DATA = ASCII characters for the dot pattern bytes.

NOTE: The DATA can be expressed in a CHR$(DATA) format with the appropriate decimal values of the ASCII characters supplied especially in cases where the dot patterns of nonprintable characters are required.

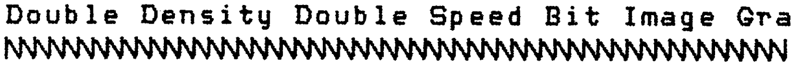
Comment For detailed information, refer to the Bit Image section in the Graphics chapter.

Example The following example produces Double Density Double Speed Bit Image graphics of the pattern used in the Single Density Bit Image Mode example. Note that the amount of data must be doubled for double density (the data is used 54 times rather than 27).

NOTE: Depending on the host computer system, it may be necessary to include a width statement within the BASIC program.

```
10 WIDTH "lpt1:",255
20 LPRINT "Double Density Double Speed Bit Image Graphics"
30 LPRINT CHR$(27);"Y";CHR$(231);CHR$(1);
40 FOR N=1 TO 54
50 RESTORE
60 FOR I=1 TO 9
70 READ R
80 LPRINT CHR$(R);
90 NEXT I
100 NEXT N
110 LPRINT CHR$(255)
120 DATA 255,128,64,32,16,8,4,2,1
```

```
Double Density Double Speed Bit Image Graphics
```



Bit Image Mode, Quadruple Density

	ASCII	Hex	Decimal
P−Series	N/A	N/A	N/A
Serial	ESC Z	1B 5A	27 90

Purpose Selects Quadruple Density Bit Image graphics.

Expression CHR$(27);″Z″;CHR$(n1);CHR$(n2);″DATA″

where n1 + 256 n2 define the number of data bytes to follow.
DATA = ASCII characters for the dot pattern bytes.

NOTE: The DATA can be expressed in a CHR$(DATA) format with the appropriate decimal values of the ASCII characters supplied especially in cases where the dot patterns of nonprintable characters are required.

Comment Quadruple Density printing may reduce print speed to half. For detailed information, refer to the Bit Image section in the Graphics chapter.

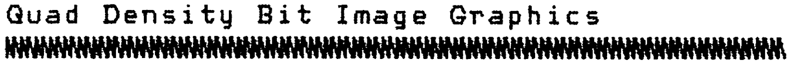
The printed density in this mode is 120 dpi horizontal and 72 dpi vertical when selected from the Data Processing print mode or 180 dpi horizontal and 96 dpi vertical when selected from the Correspondence print mode.

Example The following example produces quadruple density graphics of the pattern used in the Single Density Bit Image Mode example. Note that the amount of data must be quadrupled for quadruple density (the data is used 108 times rather than 27).

NOTE: Depending on the host computer system, it may be necessary to include a width statement within the BASIC program.

```
10 WIDTH "lpt1:",255
20 LPRINT "Quad Density Bit Image Graphics"
30 LPRINT CHR$(27);"Z";CHR$(205);CHR$(3);
40 FOR N=1 TO 108
50 RESTORE
60 FOR I=1 TO 9
70 READ R
80 LPRINT CHR$(R);
90 NEXT I
100 NEXT N
110 LPRINT CHR$(255)
120 DATA 255,128,64,32,16,8,4,2,1
```

```
Quad Density Bit Image Graphics
```



Bold Print

	ASCII	Hex	Decimal
P–Series	SFCC G SFCC j (1 line)	SFCC 47 SFCC 6A	SFCC 71 SFCC 106
Serial	ESC G	1B 47	27 71

Purpose Selects bold character printing.

Comment When the bold character printing control code is received, all characters are printed in bold until reset by the bold print reset control code or printer reset. Bold Print is the same as printing double strike. Bold character printing may reduce print speed to half.

When SFCC j is used, bold printing is selected for one line only and reset by the bold print reset control code, printer reset, or a paper motion command.

Superscript/subscript characters will cause the bold function to be implemented by a vertical "shadow" rather than a double strike. The bold attribute has no affect on superscript or subscript characters themselves.

Example The following sample program illustrates bold character printing.

```
10 LPRINT "Control code ESC G"
20 LPRINT CHR$(27);"G";
30 LPRINT "selects bold character printing,"
40 LPRINT "for example: AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPp."
50 LPRINT "Control code ESC H"
60 LPRINT CHR$(27);"H";
70 LPRINT "cancels bold character printing."
```

```
Control code ESC G
selects bold character printing,
for example: AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPp.
Control code ESC H
cancels bold character printing.
```

Bold Print Reset

	ASCII	Hex	Decimal
P–Series	SFCC H	SFCC 48	SFCC 72
Serial	ESC H	1B 48	27 72

Purpose Resets bold character printing.

Comment The bold print reset control code only resets the bold print character attribute. Other print attributes such as double wide printing are not affected.

Example Refer to the Bold Print control code for a sample program of bold character print set and reset.

Cancel

	ASCII	Hex	Decimal
P–Series	N/A	N/A	N/A
Serial	CAN	18	24

Purpose Clears the print buffer of all printable symbols since the last paper motion command was received.

Comment This control code may be used as a “delete line” function but should be used with extreme care to avoid possible misprinting. This control code will cancel the double wide attribute set by SO (in Serial Matrix printer protocol) if active. No other print attributes are affected.

Carriage Return

	ASCII	Hex	Decimal
P–Series/ Serial	CR	0D	13

Purpose Returns the logical print head to the first character column (resets the pointer to the first character position).

Comment The CR code may or may not cause printing or paper motion, depending on the DEFINE CR CODE configuration parameter value. If the DEFINE CR CODE submenu displays:

DEFINE CR CODE
CR=CR

the characters following the CR are printed over the previous characters on the line. If identical characters are placed in the same position on the line, those characters will be printed in bold (double strike) print when the Overstrike Mode is enabled from the control panel.

The CR=CR configuration causes subsequent printable data to overprint previous data at half speed if Overstrike is enabled from the control panel (and prints somewhat faster if Overstrike is disabled), unless an intervening paper motion command is received. See the Overstrike/Overlay section on Page 6–1.

If the DEFINE CR CODE submenu displays:

DEFINE CR CODE
CR=CR+LF

control code CR is converted to perform a carriage return and line feed function.

The CR code in Serial Matrix printer protocol cancels expanded (double wide) print when set by code SO and ESC SO (single line printing attribute).

Character Pitch 10 CPI

	ASCII	Hex	Decimal
P−Series	N/A	N/A	N/A
Serial	ESC P	1B 50	27 80

Purpose Sets character pitch to 10 cpi.

Comment Control Code ESC X can also be used to select a character pitch of 10 cpi. Refer to Print Mode/Pitch Selection on page 6−58.

Character Pitch 12 CPI

	ASCII	Hex	Decimal
P−Series	N/A	N/A	N/A
Serial	ESC M ESC :	1B 4D 1B 3A	27 77 27 58

Purpose Sets character pitch to 12 cpi.

Comment Control Code ESC X can also be used to select a character pitch of 12 cpi. Refer to Print Mode/Pitch Selection on page 6−58.

Character Set Select

	ASCII	Hex	Decimal
P–Series	SFCC l xyz (lowercase L)	SFCC 6C xyz	SFCC 108 xyz
Serial	ESC l xyz (lowercase L)	1B 6C xyz	27 108 xyz

Purpose Selects the character set, extended character set, and the international language for a specific character set.

Expression CHR$(27);"l";CHR$(x);CHR$(y);CHR$(z);

where **x** is the character set (Table 6–1);

y is the international language for the selected character set (Table 6–2);

z is the extended character set for the selected character set (Table 6–3);

Table 6–1. Character Set Select (x)

x	Character Set
0(30)	IBM PC
1(31)	Multinational
2(32)	ECMA 94 Latin 1
3(33)	DEC Multinational

Table 6–2. International Language Select (y)

	x 0(30)	1(31)	2(32)	3(33)
y	**IBM PC**	**Multinational**	**ECMA 94 Latin 1**	**DEC Multinational**
0(30)	ASCII (USA)	ASCII (USA)	ASCII (USA)	ASCII (USA)
1(31)	French	EBCDIC	German	French
2(32)	German		Swedish	German
3(33)	English		Danish	English
4(34)	Danish		Norwegian	Norwegian/Danish
5(35)	Swedish		Finnish	Swedish
6(36)	Italian		English	Italian
7(37)	Spanish		Dutch	Spanish
8(38)	Japanese		French	Japanese
9(39)	French Canadian		Spanish	French Canadian
10(3A)	Latin American		Italian	Dutch
11(3B)			Turkish	Finnish
12(3C)			Japanese	Swiss

Table 6−3. Extended Character Set Select (z)

z	x 0(30) IBM PC	1(31) Multinational	2(32) ECMA 94 Latin 1	3(33) DEC Multinational
0(30)	IBM PC Extended Set	Multinational Extended Set	Barcode 10 cpi	DEC Multinational Extended Set
1(31)			Multinational DP 10 cpi	
2(32)			Multinational DP 12 cpi	
3(33)			Multinational NLQ 10 cpi	
4(34)			Greek DP 10 cpi	
5(35)			Greek DP 12 cpi	
6(36)			Greek NLQ 10 cpi	
7(37)			Graphics DP 10 cpi	
8(38)			Graphics NLQ 10 cpi	
9(39)			Scientific DP 10 cpi	
10(3A)			Scientific DP 12 cpi	
11(3B)			Scientific NLQ 10 cpi	
12(3C)			Multinational (at Primary set mode and pitch)	

Comment

If the asterisk (*) is the value selected for **x**, the character set will not change. If * is the value selected for **y** or **z**, the previously selected international language and/or extended character set for the selected character set will be used.

If X is the value selected for **y**, the primary language will access the downloaded character substitution table defined by SFCC V for the selected character set. SFCC V, Download a Language, is discussed on page 6−31.

The character set, international language and extended character set can also be selected from the printer control panel. The control code setting will override the control panel selection. Except for the asterisk and X values discussed above, values other than those shown in the tables will result in the control sequence being terminated.

Refer to Appendix B for individual character set charts.

Example The following example illustrates Character Set Select, where the character set is ECMA 94, the international language is Norwegian, and the extended character set is Scientific DP 10.

```
10 LPRINT "Control code ESC 1 2 4 9 selects"
20 LPRINT "the ECMA 94 character set with the"
30 LPRINT "Norwegian international language"
40 LPRINT "and the Scientific DP 10 extended character set."
50 LPRINT
60 LPRINT "A B C [ ] { } "; CHR$(176);" ";CHR$(177)
70 LPRINT CHR$(27);"1";CHR$(2);CHR$(4);CHR$(9);
80 LPRINT "A B C [ ] { } "; CHR$(176);" ";CHR$(177)
90 LPRINT CHR$(27);"1";CHR$(0);CHR$(0);CHR$(0);
```

```
Control code ESC 1 2 4 9 selects
the ECMA 94 character set with the
Norwegian international language
and the Scientific DP 10 extended character set.

A B C [ ] { } ░ ▒
A B C Æ Å æ å ⇔ ¬
```

Character Set Select: 80−9F = Control Codes

	ASCII	Hex	Decimal
P−Series	SFCC 7	SFCC 37	SFCC 55
Serial	ESC 7	1B 37	27 55

Purpose: Selects the character set wherein hex codes 80 to 9F are control codes. Also includes hex codes 03 to 06 and 15 in Serial Matrix printer protocol. Cancels Character Set Select activated by SFCC 6 or ESC u.

Comment: This feature is also selectable from the control panel (Application Compatibility configuration menu structure).

Refer to the character set charts in Appendix B for the control codes in Serial Matrix and P−Series.

Character Set Select: 80−9F = Printable Symbols

	ASCII	**Hex**	**Decimal**
P−Series	SFCC 6	SFCC 36	SFCC 54
Serial	ESC 6	1B 36	27 54

Purpose: Selects the character set wherein hex codes 80 to 9F are printable symbols. Also includes hex codes 03 to 06 and 15 in Serial Matrix printer protocol. Cancels Character Set Select activated by ESC u.

Comment: This feature is also selectable from the control panel (Application Compatibility configuration menu structure).

Refer to the character set charts in Appendix B for the printable symbols in Serial Matrix and P−Series.

Character Set Select: 80−9F = Printable Symbols

	ASCII	Hex	Decimal
P−Series	N/A	N/A	N/A
Serial	ESC u	1B 75	27 117

Purpose: Selects the character set wherein hex codes 80 to 9F are printable symbols. Hex codes 03 to 06 and 15 are control codes. Cancels Character Set Select activated by SFCC 6.

Comment: Refer to Appendix B for the printable symbols in Serial Matrix.

Character Set Select: International Languages

	ASCII	Hex	Decimal
P−Series	SFCC PSET;n SFCC R n	SFCC 52 n	SFCC 82 n
Serial	ESC R n	1B 52 n	27 82 n

Purpose Specifies the international language set identified by “n” in the basic character set selected from the control panel (ECMA 94 Latin 1, IBM PC, Multinational, and DEC Multinational).

where “n” corresponds to the language as shown in Table 6−4 below.

Table 6−4. International Character Sets

“n”		**Character Set Selected:**			
SFCC/ ESC R (hex)	**PSET**	**ECMA 94 Latin 1**	**IBM PC**	**Multinational**	**DEC Multinational**
0(30)	**0**	ASCII (USA)	ASCII (USA)	ASCII (USA)	ASCII (USA)
1(31)	**1**	German	French	EBCDIC	French
2(32)	**2**	Swedish	German		German
3(33)	**3**	Danish	English		English
4(34)	**4**	Norwegian	Danish		Norwegian/Danish
5(35)	**5**	Finnish	Swedish		Swedish
6(36)	**6**	English	Italian		Italian
7(37)	**7**	Dutch	Spanish		Spanish
8(38)	**8**	French	Japanese		Japanese
9(39)	**9**	Spanish	French Canadian		French Canadian
0A(3A)	**10**	Italian	Latin American		Dutch
0B(3B)	**11**	Turkish			Finnish
0C(3C)	**12**	Japanese			Swiss
0D(3D)	**13**	*(currently undefined)*			
0E(3E)	**14**				
0F(3F)	**15**				
10(40)	**16**				
11(41)	**17**				
12(42)	**18**				
13(43)	**19**				
14(44)	**20**				
15(45)	**21**				

Comment

The international character set can also be selected from the control panel. The control code setting will override the control panel character set selection. Values other than those selectable from Table 6−4 will be ignored, except for SFCC RX discussed below. In PSET mode, values outside the range on Table 6−4 will produce an error message (Command Line Error Messages are listed on page 6−3). Refer to Appendix B for individual character set charts.

Selecting SFCC RX accesses the character substitution table defined by SFCC V for the current base character set. Refer to SFCC V, Download a Language, on page 6−31.

Example

The following example illustrates international character selection using the IBM PC character set.

```
10 LPRINT "Control code ESC R 5 selects"
20 LPRINT "the Swedish character set shown beneath"
30 LPRINT "the USA (ASCII) characters."
40 LPRINT
50 LPRINT "A B C D [ \ ] ^ - ` { ¦ } ~"
60 LPRINT CHR$(27);"R";CHR$(5);
70 LPRINT "A B C D [ \ ] ^ - ` { ¦ } ~"
80 LPRINT CHR$(27);"R";CHR$(0);
```


```
10 LPRINT "Control code ESC R 5 selects"
20 LPRINT "the Swedish character set shown beneath"
30 LPRINT "the USA (ASCII) characters."
40 LPRINT
50 LPRINT "A B C D [ \ ] ^ - ` { ¦ } ~"
60 LPRINT CHR$(27);"R";CHR$(5);
70 LPRINT "A B C D [ \ ] ^ - ` { ¦ } ~"
80 LPRINT CHR$(27);"R";CHR$(0);
```


```
Control code ESC R 5 selects
the Swedish character set shown beneath
the USA (ASCII) characters.

A B C D [ \ ] ^ - ` { ¦ } ~
A B C D Ä Ö Å Ü - é ä ö å ü
```

Character Set Select: ECMA 94 Latin 1 Extended

	ASCII	Hex	Decimal
P−Series	SFCC OSET;n		
Serial	N/A	N/A	N/A

Purpose Selects the Extended Character Set and the print mode and pitch at which the extended character will print. Valid only in the ECMA 94 Latin 1 Extended Character Set; otherwise, this command is ignored.

Comment n ranges from 0 to 12 to select the print mode/pitch combinations available from Table 6−5. All other values will result in an error message. In OSET mode, values outside the range in Table 6−5 will produce an error message (Command Line Error Messages are listed on page 6−3).

OSET is valid *only* when the ECMA 94 Latin 1 character set has been selected from the control panel. OSET will be ignored if the IBM PC, Multinational, or DEC Multinational Character Sets are active.

Extended characters will print at the print mode and pitch selected by the OSET command, even if that mode and pitch differs from the currently selected print mode and pitch. If the print mode differs between the extended and primary characters, the first character in the data stream selects the print mode at which that line will print. Different pitches can be printed on the same line.

Table 6−5. Print Modes/Pitches Available Using P−Series OSET (ECMA 94 Latin 1, Extended Character Set Only)

n	Print Mode/Pitch Select
0	Bar Code DP 10 cpi
1	Multinational DP 10 cpi
2	Multinational DP 12 cpi
3	Multinational NLQ 10 cpi
4	Greek DP 10 cpi
5	Greek DP 12 cpi
6	Greek NLQ 10 cpi
7	Graphics DP 10 cpi
8	Graphics NLQ 10 cpi
9	Scientific DP 10 cpi
10	Scientific DP 12 cpi
11	Scientific NLQ 10 cpi
12	Multinational at Primary Character Set Mode and Pitch

Condensed Print

	ASCII	Hex	Decimal
P–Series	See Comment.		
Serial	SI ESC SI	0F 1B 0F	15 27 15

Purpose Selects 17 characters per inch (cpi) condensed print format.

Comment Condensed print can be selected using P–Series control code SFCC X or by Serial Matrix control code ESC X. Refer to Print Mode/Pitch Selection on page 6–58.

The Serial Matrix condensed print control code SI affects all subsequent characters. After receiving code SI, all characters will be printed in condensed print until reset by ESC M, ESC P, the condensed print reset control code DC2, printer reset, or a new print mode control code. The Serial Matrix SI code (hex 0F) is equivalent to the ESC SI code. If condensed print is not allowed in the current print mode, the code is ignored.

Example The following sample program illustrates condensed character printing and reset.

```
10 LPRINT "Control code"
20 LPRINT "SI selects"
30 LPRINT CHR$(15);
40 LPRINT "condensed character printing."
50 LPRINT "Control code DC2"
60 LPRINT CHR$(18);
70 LPRINT "resets condensed character printing."
```

```
Control code
SI selects
condensed character printing.
Control code DC2
resets condensed character printing.
```

Condensed Print Reset

	ASCII	Hex	Decimal
P−Series	N/A	N/A	N/A
Serial	DC2	12	18

Purpose Resets condensed character printing to 10 cpi.

Comment The condensed print reset control code selects 10 cpi character pitch. Other print attributes are not affected.

Other control code sequences which will cancel condensed print are ESC M, ESC P, ESC @, or a new print mode control code.

Example See the Condensed Print control code example for an example of Condensed Print Reset.

Delete

	ASCII	Hex	Decimal
P–Series	N/A	N/A	N/A
Serial	DEL	7F	127

Purpose Deletes the previously received character on a line.

Comment Characters that have been truncated due to line length restrictions are not affected by this code.

Download a Language

	ASCII	Hex	Decimal
P−Series	SFCC V	SFCC 56	SFCC 86
Serial	ESC V	1B 56	27 86

Purpose To define and download an international language character substitution table which can be placed within the 224 printable symbol code points.

Expression SFCC V is followed by ASCII characters: **{QQQ}E{AAA}E{SSSSS}E**

NOTE: Each parameter is visually separated by paired brace symbols for clarity in distinguishing parameters. Do not input these brace pairs in the command sequence.

where **E** is the terminator following each numeric field.

{QQQ} represents a decimal value between 0 and 255 identifying the number of entries in the substitution table. No leading zeros are required for one− and two−digit entries. Each entry consists of:

{AAA} representing the decimal value between 0 and 255 identifying the address code that will cause the substituted character to be printed. No leading zeros are required for one− and two−digit entries;

{SSSSS} representing the decimal value between 0 and 65535 identifying the symbol point in the *Printronix* standard Character Library (page NO TAG). No leading zeros are required for less than 5−digit entries.

Comment The character substitution table is valid only for the current base character set. The character substitution table cannot be accessed within another character set or after changes have been made to the current character set. Any symbol within the Character Library in the Multinational Character Sets chapter (including downloaded characters) can be substituted into any printable symbol code point.

If {AAA} is the same value as a control character, the control character takes precedence, and printing of that value will not occur. If the Space (20 hex) is substituted, unexpected results may occur, including decreased print speed.

Once defined and downloaded by this control code, the table created by this control code can be saved into printer power−up configuration and selected from the host interface or the control panel. When selected from the host, Download a Language is accessed using SFCC RX (Character Set Select: International Languages). When selected via control panel, the message display will read “DOWNLOADED,” and a configuration printout will read DOWNLOADED in the international language section of the printout.

Download a Language (continued)

Example The following sample program illustrates Downloading a Language.

```
10 LPRINT "Control code ESC V 2E65E224E66E225E"
20 LPRINT "Downloads a language that replaces"
30 LPRINT "A with Alpha and B with Beta."
40 LPRINT "Control code ESC RX activates the"
50 LPRINT "Downloaded language."
60 LPRINT CHR$(27);"V2E65E224E66E225E"
70 LPRINT "AB"
80 LPRINT CHR$(27);"RX";
90 LPRINT "AB"
```

```
Control code ESC V 2E65E224E66E225E
Downloads a language that replaces
A with Alpha and B with Beta.
Control code ESC RX activates the
Downloaded language.

AB
αß
```

where: **ESC V {2}E{65}E{224}E{66}E{225}E**

ESC V is the Serial Matrix Control Code Header introducing the Download a Language command.

{**2**} is the quantity of entries (characters) in the substitution table (in this example, the letters A and B).

{**E**} is the numeric field terminator (required after *each* numeric field).

{**65**} is the (decimal) address code for the first character in the current character set that will cause the substituted character to be printed (Uppercase A/Alpha).

{**224**} is the (decimal) symbol point in the Character Library representing the substituted character selected (Lowercase Alpha).

{**66**} is the (decimal) address code for the second character in the current character set that will cause the substituted character to be printed (Uppercase B/Beta).

{**225**} is the (decimal) symbol point in the Character Library representing the substituted character selected (Lowercase Beta).

Download a Character

	ASCII	Hex	Decimal
P−Series	SFCC c	SFCC 63	SFCC 99
Serial	ESC c	1B 63	27 99

Purpose Defines a new character to replace any used or unused symbol point in the Character Library in a specific print mode and pitch.

Expression SFCC c is followed by ASCII characters: **{PP}{SSSSSE}{A}{data}**

NOTE: Each parameter is visually separated by paired brace symbols for clarity. Do not input these brace pairs in the command sequence.

where **{PP}** is the print mode and pitch at which the character will print. These values are defined via control panel by SFCC X (page 6−58).

{SSSSSE} is the decimal value between 0 and 65535 representing the symbol point of the new character in the Character Library (page NO TAG); **E** is the terminator following this numeric field. No leading zeros are required.

{A} is the single−digit character attributes flag representing the character position in the character cell. Bits 0 through 3 are turned on (1) or off (0) to define particular character attributes as follows:

Bit 0 indicates that the character descends below the bottom of the print line (lowercase descenders);

Bit 2 indicates that one or two dot rows near the bottom of the character will be repeated until the next print line starts (used for graphics characters);

{data} represents the two−digit hex values for each dot column of the character. The Least Significant Bit is the bottom dot row.

❑ IMPORTANT ❑

If a downloaded character replaces a predefined character in a font, that character will be changed in every character set or international language in which that symbol is used.

Comment Refer to Appendix E for complete information on Downloading Characters and practical examples.

User−defined characters have priority over standard *Printronix* characters. Downloaded characters can be accessed via SFCC V, Download a Language, described on page 6−31, or by replacing a used symbol point in the Character Library.

Elongated (Double High) Print (1 line)

	ASCII	Hex	Decimal
P−Series	SFCC h BS	SFCC 68 08	SFCC 104 08
Serial	ESC h	1B 68	27 104

NOTE: SFCC h replaces SFCC d used in some previous Printronix firmware versions.

Purpose Selects elongated (double high) character printing for one line only. Elongated characters are approximately double height but standard width.

Comment The elongated character control code is a line−by−line print attribute; when the control code is received, one entire line of elongated characters is printed and then automatically reset.

In P−Series protocol, elongated characters are formed by printing twice the number of dot rows except for the top and bottom rows. In Serial Matrix protocol, elongated characters are formed by printing twice the number of dot rows, *including* the top and bottom rows.

When configured for double high print, P−Series control code BS (Hex 08) also selects elongated character printing for a single line.

When using this feature with relative line slewing, the paper will be moved n + 1 lines rather than n lines. Refer to the Vertical Format Units chapter for more information on relative line slewing. When using small line spacing and the lines overlap, an unexpected print format may result.

Example The following sample program illustrates elongated character printing.

```
10 LPRINT "Control code"
20 LPRINT "ESC h selects"
30 LPRINT CHR$(27);"h";
40 LPRINT "elongated character printing"
50 LPRINT "for one line only."
```

```
Control code
ESC h selects
elongated character printing
for one line only.
```

Emphasized Print

	ASCII	Hex	Decimal
P−Series	SFCC E	SFCC 45	SFCC 69
Serial	ESC E	1B 45	27 69

Purpose Selects emphasized character print format.

Comment When the emphasized print control code is received, all characters will be printed in emphasized print until reset by the emphasized print reset control code or printer reset. The emphasized print attribute is implemented by horizontal “shadow” printing and may reduce the print speed to half.

Emphasized print is ignored during superscript or subscript printing, and when 15 or 17 cpi characters have been selected.

Example The following sample program illustrates emphasized character printing.

```
10 LPRINT "Control code"
20 LPRINT "ESC E selects"
30 LPRINT CHR$(27);"E";
40 LPRINT "emphasized character printing."
42 LPRINT "Control code ESC F"
50 LPRINT CHR$(27);"F";
60 LPRINT "cancels emphasized character printing."
```

```
Control code
ESC E selects
emphasized character printing.
Control code ESC F
cancels emphasized character printing.
```

Emphasized Print Reset

	ASCII	Hex	Decimal
P–Series	SFCC F	SFCC 46	SFCC 70
Serial	ESC F	1B 46	27 70

Purpose Resets emphasized character printing.

Comment The emphasized print reset control code only resets the emphasized print character attribute.

Example See the Emphasized Print control code example for an example of Emphasized Print Reset.

Expanded (Double Wide) Print

	ASCII	Hex	Decimal
P−Series	SFCC W n	SFCC 57 n	SFCC 87 n
Serial	ESC W n	1B 57 n	27 87 n

Purpose Selects or resets expanded (double wide) print.

where n = 1 selects expanded print (hex 01 or hex 31)
n = 0 resets expanded print (hex 00 or hex 30)

Comment When expanded print using SFCC W is received, all characters will be printed double wide until reset by the expanded print reset control code, printer reset (or DC4 when in Serial Matrix printer protocol).

Also refer to Serial Matrix control code SO and ESC SO, Expanded (Double Wide) Print for one line only.

Example The following sample program illustrates expanded character printing and expanded character printing reset.

```
10 LPRINT "Control code"
20 LPRINT "ESC W 1 selects"
30 LPRINT CHR$(27);"W";CHR$(1);
40 LPRINT "expanded character printing."
50 LPRINT "Control code"
60 LPRINT "ESC W 0 resets"
70 LPRINT CHR$(27);"W";CHR$(0);
80 LPRINT "expanded character printing."
```

```
Control code
ESC W 1 selects
e x p a n d e d   c h a r a c t e r   p r i n t i n g .
C o n t r o l   c o d e
E S C   W   0   r e s e t s
expanded character printing.
```

Expanded (Double Wide) Print (One Line Only)

	ASCII	Hex	Decimal
P−Series	SFCC k	SFCC 6B	SFCC 107
Serial	SO	0E	14
	ESC SO	1B 0E	27 14

Purpose Selects expanded (double wide) print for one line only.

Comment This expanded print control code is a line−by−line print attribute; when the SO, ESC SO, or SFCC k control code is received, the current line will be printed double wide and automatically reset.

This control code can be reset by a paper motion control code (LF, VT, CR, etc.), by the DC4 (double wide cancel) code, ESC @ (printer reset), CAN or ESC W (double wide print). When set by SO, double wide print is not cancelled by the Autowrap feature.

Example The following sample program illustrates Expanded Print for one line only. Another example of expanded printing is shown for Expanded (Double Wide) Print, ESC W, SFCC W on page 6−37.

```
10 LPRINT "Control code"
20 LPRINT "SO selects"
30 LPRINT CHR$(14);
40 LPRINT "expanded character printing"
50 LPRINT "for one line only."
```

```
Control code
SO selects
e x p a n d e d   c h a r a c t e r   p r i n t i n g
for one line only.
```

Extended Character Set

	ASCII	Hex	Decimal
P−Series	SO (Shift Out)	0E	14
	SFCC SO	SFCC 0E	SFCC 14
	SFCC n	SFCC 6E	SFCC 110
	SFCC 4	SFCC 34	SFCC 52
Serial	ESC 4	1B 34	27 52

Purpose Accesses the extended character set in the range A0 to FF hex using codes 20 to 7F hex.

Comment Used in 7−bit systems as if data bit 8 was set to 1. For example, sending code 20 hex accesses the symbol at code point A0 hex. If a printable symbol is not available at the code point, a space is printed.

SFCC 4 is not cancelled by the next paper motion command; all other commands are cancelled by paper motion.

Refer to the character set charts in Appendix B.

Example The following sample program illustrates Extended Character Set.

```
10 LPRINT "Control code"
20 LPRINT "ESC 4 selects the extended character set"
30 LPRINT "and ESC 5 selects the primary character set"
40 LPRINT "which is displayed beneath the extended character set."
50 LPRINT
60 LPRINT CHR$(27);"4";
70 LPRINT "ABCDEFGH"
80 LPRINT CHR$(27);"5"
90 LPRINT "ABCDEFGH"
```

```
Control code
ESC 4 selects the extended character set
and ESC 5 selects the primary character set
which is displayed beneath the extended character set.

┴┬├─┼╞╟╚

ABCDEFGH
```

Extended Character Set Cancel (Primary Character Set Select)

	ASCII	Hex	Decimal
P−Series	SI (Shift In)	0F	15
	SFCC SI	SFCC 0F	SFCC 15
	SFCC o	SFCC 6F	SFCC 111
	SFCC 5	SFCC 35	SFCC 53
Serial	ESC 5	1B 35	27 35

Purpose Cancels Extended Character Set as selected by SO, SFCC SO, SFCC n, SFCC 4 and ESC 4, and selects the Primary Character Set.

Comment Used in 7−bit systems. If data bit 8 is disabled, this control code selects the range as if data bit 8 is set to 0, and data is printed as characters from 20 to 7F hex.

Example Refer to the Extended Character Set example on the previous page.

Form Feed

	ASCII	Hex	Decimal
P−Series/ Serial	FF	0C	12

Purpose Prints the data in the buffer, advances the paper to the next top−of−form, and moves the printhead to the first character column.

Comment The default forms length is determined by the configuration in nonvolatile memory. Forms length is set by using the control panel F/L switch or forms length control codes. Code FF cancels all single−line only print attributes.

The Form Feed command will react differently in the P−Series and Serial Matrix emulation modes when the VFU is active. Refer to the Vertical Format Units chapter.

Forms Length Set (Inches)

	ASCII	Hex	Decimal
P−Series	SFCC INCHES;n.f		
Serial	ESC C NUL n	1B 43 0 n	27 67 0 n

Purpose Sets the length of forms (paper) in inches.

where n = whole numbers from 1 to 24 to specify the number of inches on a page.

f = fractional number in .5−inch increments (minimum forms length is .5 inches).

Comment Upon receipt of this code, the current line becomes the first line of the form, and the form length set becomes the current forms length. Vertical tab positions set below the bottom of the form are ignored. Vertical tab positions are cleared. Forms length is defined in inches; therefore, subsequent line spacing changes do not affect the result of this command.

The maximum forms length is 24 inches. All other values are ignored. In INCHES mode, incorrect values will produce an error message (Command Line Error messages are listed on page 6−3).

When forms length is set by the ESC C sequence, the skip−over perforation is set to zero.

Forms length can also be set by the F/L switch on the control panel. The control code forms length setting from the host computer will override the control panel setting and be reflected on the display when F/L is pressed.

In P−Series protocol, if the VFU is enabled and loaded, this command is ignored.

In P−Series protocol, .5−inch increments can be specified. For example, in P−Series protocol, sending the command **SFCC INCHES; 7.5** will result in a form length setting of 7−1/2 inches. In Serial Matrix printer protocol, only whole numbers can be specified; thus, sending the command **ESC C NUL 7** will result in a form length of 7 inches.

Forms Length Set (Lines)

	ASCII	Hex	Decimal
P−Series	SFCC LINES;n		
Serial	ESC C n	1B 43 n	27 67 n

Purpose Sets the length of a form (paper) in lines.

where n = 1 to 192 (P−Series) or 1 to 127 (Serial) to specify the number of lines per page at the current line spacing.

Comment The forms length set becomes the current forms length. Forms length is defined in inches; therefore, subsequent line spacing changes do not affect the result of this command.

The forms length is set to the number of lines defined by the quotient of “n” and the current line spacing so that the units are in inches. When using the ESC C sequence, the quotient of “n” and the current lines per inch cannot exceed 113 inches, or an incorrect forms length will result. In LINES mode, the maximum form length is 24 inches, and n values in excess of 24 will cause an error message (Command Line Error Messages are listed on page 6−3).

If the calculated forms length in lines is not an exact multiple of the paper step distance, the forms length value will be adjusted down to the next possible multiple.

When forms length is set by the ESC C sequence, the skip−over perforation is set to zero.

In P−Series protocol, if the VFU is enabled and loaded, this command is ignored.

Horizontal Tab

	ASCII	Hex	Decimal
P−Series	N/A	N/A	N/A
Serial	HT	09	09

Purpose Moves the logical printhead right to the next horizontal tab stop.

Comment Power−on default horizontal tabs are set at every eighth character in the Serial Matrix printer protocol. If there are no horizontal tabs set or the logical printhead is located at the last character column, the code is ignored and no movement occurs.

Horizontal tabs are stored as a relative position; therefore, character pitch changes will change horizontal tab positions. Refer to the Horizontal Tab Set control code to set new tab positions.

Horizontal Tab Set

	ASCII	Hex	Decimal
P−Series	N/A	N/A	N/A
Serial	ESC D n	1B 44 n	27 68 n

Purpose Sets up to 32 horizontal tab positions.

Expression CHR$(27);″D″;CHR$(n1);...CHR$(n32);CHR$(0);

where n1 through n32 specify the character column of the tab positions. CHR$(0) is the sequence terminator.

Comment Up to 32 different tab positions may be set. The values must be listed in ascending order or they are ignored. The physical tab position is the product of "n" and the current cell width (1/pitch), excluding double wide. Tabs in excess of 32 or those positioned beyond 13.2 inches are also ignored.

Tab positions may be cleared by sending the CHR$(27);"D";CHR$(0) sequence. Powering the printer on/off will initialize the tabs to every eighth character column. Horizontal tabs are accessed by control code HT.

Example The following example illustrates horizontal tab setting and accessing.

```
10 LPRINT "Control code"
20 LPRINT "ESC D CHR$(4);CHR$(10);CHR$(0)"
30 LPRINT "sets tab stops at columns 4 and 10."
40 LPRINT "Control code HT"
50 LPRINT "accesses the tab stops as follows:"
60 LPRINT CHR$(27);"D";CHR$(4);CHR$(10);CHR$(0);
70 LPRINT CHR$(9);
80 LPRINT "column 4"
90 LPRINT CHR$(9);CHR$(9);
100 LPRINT "column 10"
```

```
Control code
ESC D CHR$(4);CHR$(10);CHR$(0)
sets tab stops at columns 4 and 10.
Control code HT
accesses the tab stops as follows:
    column 4
          column 10
```

Line Feed

	ASCII	Hex	Decimal
P−Series/ Serial	LF	0A	10

Purpose Prints the data in the buffer (if any) and advances the paper one line at the current line space setting.

Comment If configured for LF equals newline (LF=CR+LF), the logical print head is positioned at character column 1 of the new line. Otherwise, the logical print head does not move when configured for LF function only (LF=LF ONLY). The LF function cancels all single line print attributes such as double high (elongated) and double wide (expanded) characters.

This code is always configured for LF=CR+LF in the P−Series protocol.

In the P−Series Even Dot Plot mode (high density graphics), the LF code does not cause paper motion; the data in the buffer is plotted and the logical print head is positioned at character column 1 in anticipation of the Odd Dot Plot control code to complete high density graphic plotting.

In the P−Series Odd Dot Plot mode (normal density graphics), the LF code plots the data in the buffer, advances the paper a single dot row at the current vertical dot density, and positions the logical print head at character column 1.

Line Feed n/216 Inch (One Line Only)

	ASCII	Hex	Decimal
P−Series	N/A	N/A	N/A
Serial	ESC J n	1B 4A n	27 74 n

Purpose Advances paper n/216 inch for one line only.

where n = 1 to 255

Comment The n/216−inch line feed control code is effective for one line only. All single−line−only print attributes are canceled.

If the printer is configured for LF equals newline (LF=CR+LF), the paper advances one line at the current line space setting and the logical print head is positioned at character column 1.

The paper moves only in multiples of the current dot row spacing. If the distance to move is other than a multiple of the current dot row spacing, the remainder is added to the next paper motion command.

Small values of n may result in overlapping lines. Overlapping lines may also occur if print attributes such as Elongated (Double High), Superscript, or Subscript characters are used on the same line. Printing at different horizontal and vertical densities will not overlap.

Example The following example illustrates n/216−inch line spacing.

```
10 LPRINT "Control code ESC J 200
20 LPRINT CHR$(27);"J";CHR$(200);
30 LPRINT "performs a 200/216 inch"
40 LPRINT "line feed function for one line only."
```

```
Control code ESC J 200




performs a 200/216 inch
line feed function for one line only.
```

Line Spacing 1/6 Inch

	ASCII	Hex	Decimal
P–Series	SFCC LPI;n SFCC 2	 SFCC 32	 SFCC 50
Serial	ESC 2	1B 32	27 50

Purpose Sets line spacing to 6 lpi or as set by ESC A.

Comment The value of **n** can be 6 or 8 only. In LPI mode using P–Series printer protocol, if n = 6, this command sets line spacing to 1/6 inch. Values of n other than 6 or 8 will cause an error message (Command Line Error Messages are listed on page 6–3).

SFCC/ESC 2 asserts n/72–inch line spacing as set by SFCC/ESC A (page 6–52). If no distance has been set by SFCC/ESC A, the distance is 1/6 inch.

The control code line spacing selection will override the control panel line spacing setting.

Example The following example illustrates 1/6–inch line spacing and assumes that a distance has not been set by ESC A.

```
10 LPRINT "Control code ESC 2 sets"
20 LPRINT CHR$(27);"2";
30 LPRINT "line spacing at"
40 LPRINT "6 lpi for all subsequent lines"
50 LPRINT "until reset or another spacing is selected."
```

```
Control code ESC 2 sets
line spacing at
6 lpi for all subsequent lines
until reset or another spacing is selected.
```

Line Spacing 1/8 Inch (8 lpi)

	ASCII	Hex	Decimal
P−Series	SFCC LPI;n SFCC 0	 SFCC 30	 SFCC 48
Serial	ESC 0	1B 30	27 48

Purpose Specifies continuous line spacing at 1/8−inch increments (8 lpi).

Comment When the 1/8−inch line spacing control code is received, all lines will be printed at 8 lpi until a new line spacing is selected or power is reset. The control code line spacing selection will override the control panel line spacing setting and 8 lpi will be reflected on the display when the 6/8 LPI switch is pressed.

The value of **n** can be 6 or 8 only. In LPI mode using P−Series printer protocol, if n = 8, this command sets line spacing to 1/8 inch. Values of n other than 6 or 8 will cause an error message (Command Line Error Messages are listed on page 6−3).

Example The following example illustrates 1/8−inch line spacing.

```
10 LPRINT "Control code ESC 0 sets"
20 LPRINT CHR$(27);"0";
30 LPRINT "line spacing at"
40 LPRINT "1/8 (8 lpi) inch for all subsequent lines"
50 LPRINT "until reset or another spacing is selected."
```

```
Control code ESC 0 sets
line spacing at
1/8 (8 lpi) inch for all subsequent lines
until reset or another spacing is selected.
```

Line Spacing 8 or 10.3 lpi (One Line Only)

	ASCII	Hex	Decimal
P–Series	ACK SFCC f	06 SFCC 66	06 SFCC 102
Serial	N/A	N/A	N/A

Purpose Selects line spacing of 1/8 or 7/72 inch for the current line only.

Comment The default line spacing is reselected automatically after one line. Line spacing may be selected either by the control panel 6/8 LPI switch or by line spacing control codes. The control code setting will override the setting on the display.

8 and 10.3 lpi spacing for one line applies only to P–Series programming compatibility.

If the alternate line spacing selected from the control panel is 8 lpi, the ACK control code will set the line spacing to 8 lpi. If 10.3 lpi was selected from the control panel, the ACK control code will set the line spacing to 10.3 lpi (7/72").

In Serial Matrix printer protocol, this line spacing command for a single line can be accomplished by using ESC J (Line Feed n/216–Inch), where: n=27 for 8 lpi, or n=21 for 10.3 lpi, and Line Feed = Newline.

Serial Matrix compatible control code ESC 0 and P–Series SFCC 0 can be used for continuous 1/8–inch line spacing.

Example The following example illustrates printing a single line of text at 8 lpi.

```
10 LPRINT "Control code ACK"
20 LPRINT "selects 8 lpi line spacing"
30 LPRINT CHR$(6);"for one line only."
40 LPRINT "The default line spacing is"
50 LPRINT "then reselected automatically."
```

```
Control code ACK
selects 8 lpi line spacing
for one line only.
The default line spacing is
then reselected automatically.
```

Line Spacing 7/72 Inch

	ASCII	Hex	Decimal
P−Series	SFCC 1	SFCC 31	SFCC 49
Serial	ESC 1	1B 31	27 49

Purpose Specifies the line spacing at 7/72−inch increments.

Comment When the 7/72−inch line spacing control code is received, all lines will be printed at the 7/72−inch line spacing until a new line spacing is selected or power is reset. The control code line spacing selection will override the control panel line spacing setting, and the message display will reflect the line spacing as 10.3 lines per inch.

Caution should be used when combining this control code with other print attributes such as Elongated (Double High), Superscript, or Subscript; overlapping lines may occur. Printing at different horizontal and vertical densities will not overlap.

Example The following example illustrates 7/72−inch line spacing.

```
10 LPRINT "Control code ESC 1 sets"
20 LPRINT CHR$(27);"1";
30 LPRINT "line spacing at"
40 LPRINT "7/72 inch for all subsequent lines"
50 LPRINT "until reset or another spacing is selected."
```

```
Control code ESC 1 sets
line spacing at
7/72 inch for all subsequent lines
until reset or another spacing is selected.
```

Line Spacing n/72 Inch

	ASCII	Hex	Decimal
P–Series	SFCC A n	SFCC 41 n	SFCC 65 n
Serial	ESC A n	1B 41 n	27 65 n

Purpose Stores a line spacing of n/72–inch increments.

where n = 1 to 85 (all others are ignored)

Comment When the ESC A control sequence is received, all line feed commands following an ESC 2 sequence* will be at n/72–inch line spacing until a new line spacing is selected or power is reset. The control code line spacing selection will override the control panel line spacing setting and the message display will reflect the line spacing in lines per inch. For the 20/72–inch example below, the message display would reflect 3.6 lpi spacing.

*The SFCC/ESC 2 sequence (page 6–48) asserts the line spacing which was stored by the preceding SFCC/ESC A sequence.

Small values of n may result in overlapping lines. Overlapping lines may also occur if print attributes such as Elongated (Double High), Superscript, or Subscript characters are used on the same line. Printing at different horizontal and vertical densities will not overlap.

Example The following example illustrates 20/72–inch line spacing.

```
10 LPRINT "Control code ESC A 20 sets"
20 LPRINT CHR$(27);"A";CHR$(20);CHR$(27);"2";
30 LPRINT "line spacing at 20/72 inch"
40 LPRINT "increments for all subsequent lines"
50 LPRINT "until reset or another spacing is selected."
```

```
Control code ESC A 20 sets
line spacing at 20/72 inch

increments for all subsequent lines

until reset or another spacing is selected.
```

Line Spacing n/216 Inch

	ASCII	Hex	Decimal
P−Series	SFCC 3 n	SFCC 33 n	SFCC 51 n
Serial	ESC 3 n	1B 33 n	27 51 n

Purpose Specifies the line spacing at n/216−inch increments.

where n = 1 to 255

Comment When the n/216−inch line spacing control code is received, all line feeds following will be at n/216−inch line spacing until a new line spacing is selected or power is reset. The control code line spacing selection will override the control panel line spacing setting and the message display will reflect the line spacing in lines per inch. For a 50/216−inch line spacing, the message display would reflect 4.3 lpi spacing.

The paper moves only in multiples of the current dot row spacing. If the distance to move is other than a multiple of the current dot row spacing, the remainder is added to the next paper motion command.

Caution should be used when combining this control code with other print attributes such as Elongated (Double High), Superscript, or Subscript; overlapping lines may occur. Printing at different horizontal and vertical densities will not overlap.

Example The following example illustrates n/216−inch line spacing.

```
10 LPRINT "Control code ESC 3 50 sets"
20 LPRINT CHR$(27);"3";CHR$(50);
30 LPRINT "line spacing at 50/216 inch"
40 LPRINT "increments for all subsequent lines"
50 LPRINT "until reset or another spacing is selected."
```

```
Control code ESC 3 50 sets
line spacing at 50/216 inch
increments for all subsequent lines
until reset or another spacing is selected.
```

Overscoring

	ASCII	Hex	Decimal
P−Series	SFCC _ n	SFCC 5F n	SFCC 95 n
Serial	ESC _ n	1B 5F n	27 95 n

Purpose Enables or disables automatic overscoring of all characters.

where n = 0 to disable automatic overscoring (hex 00 or hex 30)
n = 1 to enable automatic overscoring (hex 01 or hex 31)

Comment When automatic overscore is enabled, all characters, including spaces, will be overscored until disabled.

Example The following sample program illustrates automatic overscoring and overscoring reset.

```
10 LPRINT "Control code ESC _ 1"
20 LPRINT CHR$(27);"_";CHR$(1);
30 LPRINT "enables automatic overscoring."
40 LPRINT "Control code ESC _ 0"
50 LPRINT CHR$(27);"_";CHR$(0);
60 LPRINT "disables automatic overscoring."
```

```
Control code ESC _ 1
enables automatic overscoring.
Control code ESC _ 0
disables automatic overscoring.
```

Plot, Even Dot (P−Series High Density Graphics)

	ASCII	Hex	Decimal
P−Series	EOT SFCC d	04 SFCC 64	04 SFCC 100
Serial	N/A	N/A	N/A

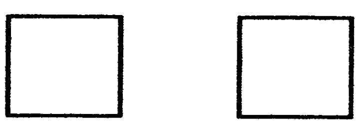
Purpose Prints dots at the even numbered dot columns.

Comment The even dot plot code is used for programming high density graphics and must be used in conjunction with the Odd Dot Plot code (05 hex). Refer to the P−Series Compatible Plot Mode section in the Graphics chapter for detailed plot mode information.

Example Print two high density plot boxes using odd and even dot plot for high density graphics. Compare the example below to the normal density odd dot plot example on page 6−56.

```
10 LPRINT "EVEN AND ODD DOT PLOT" : LPRINT
20 LPRINT CHR$(4);"??????@@@@@@??????"
30 LPRINT CHR$(5);"??????@@@@@@??????"
40 FOR I=1 TO 36
50 LPRINT CHR$(4);"A@@@@ @@@@@@A@@@@ "
60 LPRINT CHR$(5);"A@@@@ @@@@@@A@@@@ "
70 NEXT I
80 LPRINT CHR$(4);"??????@@@@@@??????"
90 LPRINT CHR$(5);"??????@@@@@@??????"
```

```
EVEN AND ODD DOT PLOT
```



Plot, Odd Dot (P−Series Normal Density Graphics)

	ASCII	Hex	Decimal
P−Series	ENQ SFCC e	05 SFCC 65	05 SFCC 101
Serial	N/A	N/A	N/A

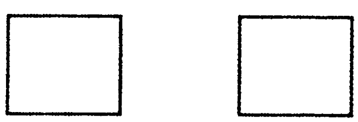
Purpose Prints dots at the odd numbered dot columns.

Comment This is the P−Series programming normal density graphics control code. The ENQ code should occur before any printable data in the data stream. For high density graphics, the Even Dot Plot code (04 hex) must be used in conjunction with (and precede) the Odd Dot Plot code. Refer to the P−Series Compatible Plot Mode section in the Graphics chapter for detailed plot mode information.

Example Print two normal density plot boxes using odd dot plot. Compare the odd dot plot example below to the high density Even Dot Plot example on page 6−55.

```
10 LPRINT "ODD DOT PLOT" : LPRINT
20 LPRINT CHR$(5);"??????@@@@@@??????"
30 FOR I=1 TO 36
40 LPRINT CHR$(5);"A@@@@ @@@@@@A@@@@ "
50 NEXT I
60 LPRINT CHR$(5);"??????@@@@@@??????"
```

```
ODD DOT PLOT
```



Printer Reset

	ASCII	Hex	Decimal
P−Series	SFCC @	SFCC 40	SFCC 64
Serial	ESC @	1B 40	27 64

Purpose Initializes all print mode related parameters to values previously saved.

Comment When reset to the previously saved values, the current line is set to the top−of−form position. Print mode, line spacing, international language selection, form length, skip−over perforation, and character pitch are reset to previously saved values. Character−by−character and line−by−line attributes are canceled. The vertical format unit is cleared. Interface parameters and protocol mode (P−Series or Serial Matrix) are not affected.

In the Serial Matrix protocol, this command will set horizontal tabs at every eighth character column.

Print Mode/Pitch Selection

	ASCII	Hex	Decimal
P−Series	SFCC PMODE;n SFCC X mn	 SFCC 58 mn	 SFCC 88 mn
Serial	ESC X mn	1B 58 mn	27 88 mn

Purpose Selects the print mode (Data Processing, Correspondence, High Speed, or OCR) and character pitch in characters per inch (cpi).

where **In SFCC PMODE;n**
n ranges from 0 to 6 to select the print mode/pitch combinations available from Table 6−6. All other values will result in an error message. (Command Line Error Messages are listed on page 6−3).

where **In SFCC X mn** and **ESC X mn**
m = Print Mode code n = Pitch (cpi)

An asterisk (*) (hex 2A) may be substituted for **m** or **n**. Whenever the asterisk replaces **m** or **n**, then its current value will not change. Values other than those shown in Table 6−7 are ignored.

NOTE: While the value X used in earlier Printronix firmware versions remains valid for **m** *or* **n***, it is recommended that the asterisk replace X.*

Comment P−Series PMODE switches to the Primary Character Set and selects print mode and pitch.

A complete table identifying print rates, pitch, and dot densities for all print modes is located in the Appendix.

Print mode and pitch can also be selected from the control panel. The print mode/pitch select control code from the host computer will override the control panel print mode setting and the print mode and pitch selection will be reflected on the message display when the PRINT MODE switch is pressed.

Table 6−6. Print Modes/Pitches Available Using P−Series PMODE

n	Print Mode & Pitch
0	Data Processing 10 cpi
1	Data Processing 12 cpi
2	Data Processing 15 cpi
3	Correspondence (NLQ) 10 cpi
4	High Speed 10 cpi
5	OCR−A 10 cpi
6	OCR−B 10 cpi

Print Mode/Pitch Selection (continued)

Table 6−7. Character Pitches Available by Print Mode

NOTE: The hex values shown (ie: 0 and 30) are equivalent. Either value can be used in your program expression.

m (hex):	0(30)	1(31)	2(32)	3(33)	4(34)	5(35)	6(36)
PRINT MODE:	Data Processing (DP)	Correspondence (NLQ)	High Speed (HS)	High Speed B (HSB)	High Speed C (HSC)	OCR−A	OCR−B
n (hex):	**Characters per inch:**						
0(30)	10	10	10	10	10	10	10
1(31)	12	12	12	12	12	–	–
2(32)	13.3	–	13.3	13.3	13.3	–	–
3(33)	15	15	15	15	15	–	–
4(34)	17.1	–	17.1	17.1	17.1	–	–

NOTE: The print mode (m) must be changed before the first printable symbol of a print line (spaces included) or the command sequence is deferred until the next line.

NOTE: When using the Multinational character set in OCR−A or OCR−B print mode, a unique character set is used. Refer to the Multinational Character Sets chapter for more information.

Example Any of the BASIC expressions listed below will select the Data Processing print mode at 17.1 cpi.

where: **m** (print mode) = 0 or 30 for Data Processing; and
n (pitch) = 4 or 34 for 17.1 cpi.

CHR$(1);“X”;CHR$(0);CHR$(4);

CHR$(1);“X”;CHR$(30);CHR$(34);

CHR$(1);“X04”;

Printer Select

	ASCII	Hex	Decimal
P−Series	N/A	N/A	N/A
Serial	DC1	11	17

Purpose Places printer in the selected state.

Comment When the configuration parameter PRINTER SELECT is enabled, this control code will allow the printer to receive and print data from the host.

Printer Deselect (code DC3) disables the printer from receiving data.

Printer Deselect

	ASCII	Hex	Decimal
P−Series	N/A	N/A	N/A
Serial	DC3	13	19

Purpose Places printer in the deselected state.

Comment When the configuration parameter PRINTER SELECT is enabled, this control code will disable the printer from receiving and printing data from the host. Until a DC1 (Printer Select) command is received, all subsequent data to the printer is ignored.

NOTE: When the configuration parameter PRINTER SELECT is enabled and saved in NOVRAM, the printer will power up in the deselected state.

RibbonMinder, Enable/Disable

	ASCII	Hex	Decimal
P−Series	SFCC r E SFCC r D	SFCC 72 45 SFCC 72 44	SFCC 114 69 SFCC 114 68
Serial	ESC r E ESC r D	1B 72 45 1B 72 44	27 114 69 27 114 68

Purpose Enables or disables the RibbonMinder printer action.

where **E** = enable
D = disable

Comment Refer to the RibbonMinder chapter for more information.

Example The following sample program illustrates the control code for a RibbonMinder setup for a typical job: Job Rate = 270; When Worn Action = Stop Printer; Enable/Disable = Enable.

```
10 LPRINT "Control Code ESC r J sets the job rate."
20 LPRINT CHR$(27);"rJ270E";
30 LPRINT "Control Code ESC r A S sets the when worn action."
40 LPRINT CHR$(27);"rAS";
50 LPRINT "Control Code ESC r E enables the RibbonMinder."
60 LPRINT CHR$(27);"rE";
70 LPRINT "The remainder of the job follows."
```

```
Control Code ESC r J sets the job rate.
Control Code ESC r A S sets the when worn action.
Control Code ESC r E enables the RibbonMinder.
The remainder of the job follows.
```

RibbonMinder, Set Job Rate

	ASCII	Hex	Decimal
P–Series	SFCC r J NNNN E	SFCC 72 4A NNNN 45	SFCC 114 74 NNNN 69
Serial	ESC r J NNNN E	1B 72 4A NNNN 45	27 114 74 NNNN 69

Purpose Sets printer job rate.

P–Series Expression (using SOH) CHR$(1);“rJNNNNE”;

Serial Expression CHR$(27);“rJNNNNE”;

where **NNNN** is the JOB RATE expressed as a decimal number having between one and four digits. NNNN must be a value between 0 and 1000, and is represented by an ASCII sequence. For example, if the JOB RATE value is 341, the serial control code sequence will be CHR$(27);“rJ341E”;

E is the terminator following the NNNN field.

Comment Refer to the RibbonMinder chapter to determine the job rate and job analysis, and for more information on the RibbonMinder feature.

Example Refer to the RibbonMinder Enable/Disable control code on page 6–62.

RibbonMinder, When Worn Action

	ASCII	Hex	Decimal
P–Series	SFCC r A S	SFCC 72 41 53	SFCC 114 65 83
	SFCC r A A	SFCC 72 41 41	SFCC 114 65 65
	SFCC r A V	SFCC 72 41 56	SFCC 114 65 86
Serial	ESC r A S	1B 72 41 53	27 114 65 83
	ESC r A A	1B 72 41 41	27 114 65 65
	ESC r A V	1B 72 41 56	27 114 65 86

Purpose Determines printer action when ribbon is worn.

P–Series Expression (using SOH)

CHR$(1);“rAS”;
CHR$(1);“rAA”;
CHR$(1);“rAV”;

Serial Expression

CHR$(27);“rAS”;
CHR$(27);“rAA”;
CHR$(27);“rAV”;

where

S = stops the printer upon completion of the page when a worn ribbon is detected
A = activates audio and visual alarm when a worn ribbon is detected
V = activates only visual alarm when a worn ribbon is detected

Comment Refer to the RibbonMinder chapter for more information.

Example Refer to the RibbonMinder Enable/Disable control code on page 6–62.

Skip–Over Perforation

	ASCII	Hex	Decimal
P–Series	N/A		
Serial	ESC N n	1B 4E n	27 78 n

Purpose Selects the number of lines (at the current line spacing) for the paper "skip" at the bottom of the perforated page.

where n = 1 to 127 to select the number of lines to skip. If the value of n exceeds the current forms length, it is ignored.

Comment The actual distance set is the product of "n" and the current line spacing. Factory default value disables skip–over perforation. The current default value may be set by the operator. Setting a new forms length (ESC C) resets skip–over perforation to zero.

This feature is disabled whenever vertical tabs are set.

Skip–over perforation can also be selected from the control panel; however, vertical tabs within the skip–over perforation zone, as set by the control panel, are ignored. The control code skip–over perforation setting from the host computer will override the control panel setting.

Skip–Over Perforation Cancel

	ASCII	Hex	Decimal
P–Series	N/A	N/A	N/A
Serial	ESC O (alpha O)	1B 4F n	27 79 n
Purpose	Resets skip–over perforation to zero.		

Superscript/Subscript Printing

	ASCII	Hex	Decimal
P−Series	SFCC S n	SFCC 53 n	SFCC 83 n
Serial	ESC S n	1B 53 n	27 83 n

Purpose Selects superscript or subscript printing.

where n = 0 to enable superscript printing (hex 00 or hex 30)
n = 1 to enable subscript printing (hex 01 or hex 31)

Comment Super/Subscript font prints at one−half the normal vertical character height and at twice the normal vertical density. When the super/subscript control code is received, all characters will be superscript or subscript until reset by the super/subscript reset control code or printer reset. Emphasized print is ignored in the super/subscript print mode.

In Serial Matrix protocol, or when the BS feature is enabled from the control panel in P−Series protocol, both superscript and subscript characters can be printed in the same character column using the Backspace (BS) control code (page 6−7).

Caution should be used when combining Superscript or Subscript printing with other print attributes such as Elongated (Double High), or small line spacing; overlapping lines may occur. Characters with different horizontal or vertical dot densities will not overlap.

Example The following sample program illustrates superscript/subscript printing and reset.

```
10 LPRINT "Control Code ESC S 0 selects";
20 LPRINT CHR$(27);"S";CHR$(0);" SUPERSCRIPT";CHR$(27);"T"
30 LPRINT "A";CHR$(27);"S";CHR$(0);"2";CHR$(27);"T";
40 LPRINT "+B";CHR$(27);"S";CHR$(0);"2";CHR$(27);"T";
50 LPRINT "=C";CHR$(27);"S";CHR$(0);"2";
60 LPRINT CHR$(27);"T"
70 LPRINT "Control Code ESC S 1 selects";
80 LPRINT  CHR$(27);"S";CHR$(1);" SUBSCRIPT";CHR$(27);"T"
90 LPRINT "31";CHR$(27);"S";CHR$(1);"HEX";CHR$(27);"T";
100 LPRINT "=48";CHR$(27);"S";CHR$(1);"DEC";
110 LPRINT CHR$(27);"T"
120 LPRINT "Control Code ESC T cancels"
130 LPRINT "superscript/subscript printing."
```

Control Code ESC S 0 selects ^{SUPERSCRIPT}
$A^2+B^2=C^2$
Control Code ESC S 1 selects $_{SUBSCRIPT}$
$31_{HEX}=48_{DEC}$
Control Code ESC T cancels
superscript/subscript printing.

Superscript/Subscript Printing Reset

	ASCII	Hex	Decimal
P–Series	SFCC T	SFCC 54	SFCC 84
Serial	ESC T	1B 54	27 84

Purpose Resets superscript and subscript printing.

Comment/ Example See the Superscript/Subscript control code example for an example of superscript/subscript reset.

Underline

	ASCII	Hex	Decimal
P−Series	SFCC − n	SFCC 2D n	SFCC 45 n
Serial	ESC − n	1B 2D n	27 45 n

Purpose Enables or disables automatic underlining of all characters.

where n = 0 to disable automatic underlining (hex 00 or hex 30)
n = 1 to enable automatic underlining (hex 01 or hex 31)

Comment When automatic underline is enabled, all characters, including spaces, will be underlined until disabled.

Example The following sample program illustrates automatic underlining and underlining reset.

```
10 LPRINT "Control code ESC -1"
20 LPRINT CHR$(27);"-";CHR$(1);
30 LPRINT "enables automatic underlining."
40 LPRINT "Control code ESC -0"
50 LPRINT CHR$(27);"-";CHR$(0);
60 LPRINT "disables automatic underlining."
```

```
Control code ESC -1
enables automatic underlining.
Control code ESC -0
disables automatic underlining.
```

VFU Commands (P−Series)

	ASCII	Hex	Decimal
P−Series	Refer to the Vertical Format Units chapter.		
Serial	N/A	N/A	N/A

NOTE: If the SFCC being used is ESC, the PI line must be set high when using the EVFU.

Purpose Load and execute the VFU.

Comment Refer to the Vertical Format Units chapter for detailed information.

Vertical Tab

	ASCII	Hex	Decimal
P−Series/ Serial	VT	0B	11

Purpose Prints the data in the buffer and advances the paper to the next vertical tab position.

Comment In P−Series protocol, if a vertical tab format is defined in the EVFU (channel 12), DVFU, NVFU, or CVFU (channel 2) and the VFU is enabled, the paper is moved to the next vertical tab position.

In Serial Matrix protocol, vertical tab positions are set by control code ESC B and executed by control code VT. In this mode, if Vertical Tabs are loaded, the paper moves to the next vertical tab position.

If a vertical tab format is not defined, the paper is advanced to the next line at the current line spacing. If a vertical tab format is defined but no vertical tab positions are set between the current print position and the end of the form, the paper is advanced to the top of the next form. The VT code resets all single line print attributes. More information on Vertical Tabs is provided in the Vertical Format Units chapter.

Vertical Tab Set/Clear (Serial Matrix)

	ASCII	Hex	Decimal
P−Series	N/A	N/A	N/A
Serial	ESC B n	1B 42 n	27 66 n

Purpose Sets vertical tab positions.

Expression CHR$(27);″B″;CHR$(n);...CHR$(nk);CHR$(0);

where n1 through nk specify the line number for the vertical tab(s), for a maximum of 16 tab positions. Either CHR$(0) or CHR$(128) can be used as the sequence terminator.

Comment The physical position on the paper is the product of "n" and the current line spacing. Subsequent line spacing changes do not change the tab position. If the value of "n" defines a tab stop that exceeds the forms length, that tab position is ignored.

In Serial Matrix printer protocol, vertical tab positions are set by control code ESC B and executed by control code VT. The tab positions must be in ascending order or the sequence will terminate. More information regarding Serial Matrix vertical tab setting is provided in the Vertical Format Units chapter.

If the ESC B command is followed immediately by a sequence terminator, the vertical tab positions are cleared.

Example The following sample program illustrates Vertical Tab Setting.

```
10 LPRINT "Control code"
20 LPRINT "ESC B 15 20 0 sets a vertical tab at line 15 and at line 20
30 LPRINT CHR$(27);"B";CHR$(15);CHR$(20);CHR$(0);
40 LPRINT "Control code VT moves paper to the next vertical tab."
50 LPRINT CHR$(11);
60 LPRINT "Control code VT moves paper to the next vertical tab."
70 LPRINT CHR$(11);
80 LPRINT "This is line twenty."
```

```
Control code
ESC B 15 20 0 sets a vertical tab at line 15 and at line 20.
Control code VT moves paper to the next vertical tab.

Control code VT moves paper to the next vertical tab.




This is line twenty.
```

CHAPTER 7

INTERFACES

Introduction

The P9012 printer is equipped with resident parallel and serial interfaces. Only one interface can be enabled at a time via the control panel. An optional Dataproducts Long Lines Adapter is available and replaces the Dataproducts and Centronics interface capability. Other optional interfaces include an Intelligent Graphics Processor, PI−3287, and PI−5225. Contact your authorized service representative for details.

This chapter describes:

- Dataproducts Parallel Interface
- Centronics Parallel Interface
- Alternate Terminating Resistors
- RS−232 Serial Interface

Dataproducts Parallel Interface

This interface allows the printer to operate with controllers designed for Dataproducts printers using a 50−pin AMP Ampilite HDH−20 connector. The interface is capable of transferring up to 500,000 characters per second. The maximum data line length (cable length) from the controller (host computer) to the printer is 40 feet (12 meters). An optional Long Lines Interface allows this distance to be extended to 500 feet (150 meters). An adapter cable to accept the 50−pin Winchester MRAC50P connector is also available from your authorized service representative.

Dataproducts Interface Signals

Table 7−1 and Table 7−2 list the Dataproducts interface connector pin assignments. Dataproducts compatible interface signals between the computer and the printer are defined as follows.

Ready Line − A high true signal from the printer indicating AC power and DC voltages are present, paper is loaded properly, and the printer is not in a fault condition.

On Line − A high true signal from the printer indicating the Ready Line is true and the ON LINE switch on the control panel has been activated. The printer is ready to accept data from the host.

Data Request − A high true signal from the printer to synchronize host data transmission with printer timing. This signal goes true when the printer is ready to receive data. It changes to the false state shortly after the leading edge of the data strobe signal.

Data Strobe – A high true pulse from the host to indicate that data is ready. The data strobe must remain high at least until the Data Request line goes false.

Data Lines – Eight standard or inverted levels from the host that specify character data, plot data, or a control code. Sensing Data Line 8 is controlled by printer configuration.

Paper Instruction (PI) – Optional standard or inverted level VFU signal from the host with the same timing and polarity as the data lines. PI line sensing is controlled by printer configuration.

NOTE: The PI Line must be disabled (configuration option selected from the front panel) if the host computer does not drive or control the PI Line. If the line is not controlled by the host and sensing is enabled, rapid paper slewing will occur.

Interface Verification – Two pins on the interface connector jumpered together allow you to verify proper installation of the interface connector.

NOTE: The +5 volt test is only connectable with a jumper.

Table 7–1. Connector Pin Assignments for Dataproducts Interface with AMP Connector

OUTPUT SIGNAL	PIN	INPUT SIGNAL	PIN
Ready	22	Data Line 1	19
Return	6	Return	3
On Line	21	Data Line 2	20
Return	5	Return	4
Data Request	23	Data Line 3	1
Return	7	Return	2
Return	39	Data Line 4	41
		Return	40
I/F Verif.	45, 46	Data Line 5	34
		Return	18
Paper Instr.	30	Data Line 6	43
Return	14	Return	42
		Data Line 7	36
		Return	35
		Data Line 8	28
		Return	44
		Data Strobe	38
		Return	37

Pins not listed are not connected.

Table 7−2. Connector Pin Assignments for Dataproducts Interface with Winchester Connector (optional)

OUTPUT SIGNAL	PIN	INPUT SIGNAL	PIN
Ready	CC	Data Line 1	B
Return	EE	Return	D
On Line	y	Data Line 2	F
Return	AA	Return	J
Return	K	Data Line 3	L
		Return	N
Data Request	E	Data Line 4	R
Return	C	Return	T
I/F Verif.	x	Data Line 5	V
Return	v	Return	X
Paper Instr.	p	Data Line 6	Z
Return	s	Return	b
		Data Line 7	n
		Return	k
		Data Line 8	u
		Return	w
		Data Strobe	j
		Return	m

Pins not listed are not connected.

Dataproducts Parallel Interface Configuration

The printer is configured at the factory according to the specified interface as shown in the Configuration chapter. However, the interface configuration parameters can be changed. The following configuration parameters can be verified or changed as necessary to meet specific application requirements:

- Input Buffer Size (Selected from the Application Compatibility Menu)
- Data Bit 8 (enable or disable)
- PI Line (enable or disable)
- Data Polarity (standard or inverted)
- Response Polarity (standard or inverted)
- Strobe Polarity (standard or inverted)
- Latch Data On Leading or Trailing Edge of Strobe

These parameters are displayed under the Application Compatibility/Host Interface/ Dataproducts submenu selectable from the control panel. Refer to the Control Panel Configuration Diagram in the Configuration chapter for information on selecting the various parameter values.

Based on the application, a unique configuration may be required. If the printer is not working properly for the configuration selected, contact your authorized service representative.

Centronics Parallel Interface

This interface enables the printer to operate with controllers designed for buffered Centronics printers. The interface is capable of transferring up to 200,000 characters per second. The maximum data line length (cable length) from the controller (host computer) to the printer is 40 feet.

Centronics Interface Signals

Table 7−3 lists the Centronics interface connector pin assignments. Centronics interface signals between the computer and the printer are defined following the table.

Table 7−3. Centronics Interface Connector Pin Assignments

INPUT SIGNALS SIGNAL	PIN	OUTPUT SIGNALS SIGNAL	PIN
Data Line 1	2	ACKNLG	10
Return	20	Return	28
Data Line 2	3		
Return	21	SLCT	32, 13
Data Line 3	4		
Return	22	PE	12
Data Line 4	5		
Return	23	Busy	11
Data Line 5	6	Return	29
Return	24		
Data Line 6	7	Chassis Ground	17
Return	25		
Data Line 7	8		
Return	26	Spare	30,31, 34,35, 36
Data Line 8	9		
Return	27		
Paper Instruction	15		
Return	14		
Data Strobe	1		
Return	19		

PE − A high true level from the printer to indicate the printer is in a fault condition.

SLCT − A high true level from the printer to indicate the printer is ready for data transfer and the ON LINE switch has been activated.

Busy − A high true level from the printer to indicate the printer cannot receive data.

ACKNLG − A low true pulse from the printer indicating the character or function code has been received and the printer is ready for the next data transfer.

Data Strobe − A low true, 100 ns minimum pulse from the host to clock data into the printer.

Data Lines − Eight standard or inverted levels from the host that define the data, which may consist of a character or function code. Sensing Data Line 8 is controlled by printer configuration.

Paper Instruction (PI) − Optional VFU control signal from the host with the same timing and polarity as the data lines. PI line sensing is controlled by printer configuration.

NOTE: The PI Line must be disabled (configuration option selected from the front panel) if the host does not drive or control the PI Line. If the line is not controlled by the host and sensing is enabled, rapid paper slewing will occur.

Centronics Parallel Interface Configuration

The printer is configured according to the interface specified during printer configuration (refer to the Configuration chapter). If, however, the interface configuration parameters need to be changed, printer configuration is also user selectable. The following configuration parameters can be verified or changed as necessary to meet specific application requirements:

- Input Buffer Size (Selected from the Application Compatibility Menu)
- Data Bit 8 (Enable or Disable)
- PI Line (Enable or Disable)
- Data Polarity (standard or inverted)
- Response Polarity (standard or inverted)
- Latch Data On Leading or Trailing Edge of Strobe
- Fast Busy (Enable or Disable)

These parameters are displayed under the Application Compatibility/Host Interface/Centronics submenu selectable from the control panel. Refer to the Control Panel Configuration Diagram in the Configuration chapter for information on selecting the various parameter values.

Alternate Terminating Resistors

For parallel interface configurations, the printer is equipped with 470 ohm pullup and 1K pulldown terminating resistors located at board coordinates 5V and 4V respectively, on the DCU PCBA 132015. Generally, these terminating resistors are suitable for most applications. If, however, the standard terminating resistor pack is not compatible with the particular interface driver requirements of the host, other values of pullup/pulldown resistors may be necessary. *Printronix* provides the 220 ohm pullup and 330 ohm pulldown alternate terminating resistors. If the 220 ohm pullup resistor is used, the 330 ohm pulldown resistor should be used with it.

To install the alternate terminating resistors, perform the following steps.

1. Turn the printer off and disconnect the AC power cord.
2. Remove the DCU PCBA as described in Appendix F, Hardware Jumper Configuration.
3. Remove the 470 ohm resistor pack from the socket at location 5V.
4. Plug the 220 ohm resistor pack into the socket at location 5V.
5. Remove the 1K ohm resistor pack from the socket at location 4V.
6. Plug the 330 ohm resistor pack into the socket at 4V.
7. Re−install the DCU PCBA as described in Appendix F, Hardware Jumper Configuration.
8. Reconnect the AC power cord and turn the printer on.

RS−232 Serial Interface

This interface is used with bit serial devices compatible with EIA− RS−232C or CCITT V.24 standards. The serial data transfer baud rate is selectable from the control panel. Baud rates of

150, 300, 600, 1200, 2400, 4800, 9600, 19200, or external control are available. Baud rates are selected from the control panel; external control is selected by jumper configuration on the DCU board as described in Appendix F, Hardware Jumper Configuration.

The input format consists of a single start bit, 7 or 8 data bits, and one or two stop bits. The operator can set the number of data bits from the control panel. The data bits are interpreted with the least significant bit first. The operator can also set parity checking via control panel. The printer interface uses a first−in/first−out buffer with the size selectable from the control panel. The asynchronous interface accepts data as it is provided by the host computer. The maximum cable length from the host computer to the printer is 50 feet (15 meters). The interface circuit characteristics are compatible with the Electronic Industry Association Specification (EIA−RS−232C).

RS−232 Interface Signals

The RS−232 connector is a 25 pin DB−25S type. The mating connector is a DB−25P. Signal Pin assignments are listed in Table 7−4. RS−232 compatible serial interface signals between the computer and the printer are defined following the table.

Table 7−4. Serial Interface Pin Assignments

INPUT SIGNALS		OUTPUT SIGNALS	
SIGNAL	**PIN**	**SIGNAL**	**PIN**
Received Data	3	Transmitted Data	2
Clear To Send	5	Request To Send	4
Data Set Ready	6	Reverse Channel	11,14
Carrier Detect	8	Data Terminal Ready	20
Transmit Clock	15	Chassis Ground	1
Receive Clock	17	Signal Ground	7
External Clock	25		

Received Data − Serial data stream to the printer.

Transmitted Data − Serial data stream from the printer for transmitting status and control information to the host. Subject to protocol selection.

Request To Send (RTS) − Control signal from the printer. Subject to configuration.

Clear To Send (CTS) − Status signal to the printer indicating the host is ready to receive data/status signals from the printer. When CTS is enabled, DSR and CTS must both be asserted for the printer to transmit flow control characters to the host.

Data Set Ready (DSR) − Status signal to the printer indicating the host is in a ready condition. DSR is ignored unless CTS or CD are enabled.

Carrier Detect (CD) − Status signal to the printer. The ON condition is required for the printer to receive data. Available as a configuration setup option. When CD is enabled, the host must assert both DSR and CD for the printer to accept data.

Reverse Channel − Control signal from the printer. Subject to configuration.

Data Terminal Ready (DTR) – Control signal from the printer. Subject to configuration.

RS–232 Serial Interface Protocols

The following serial interface protocol characters are available. The protocol can be configured from the control panel to meet host interface requirements.

X–ON/X–OFF – The printer transmits an X–ON character (hex 11) when entering the on line state or when the buffer is almost empty. The printer transmits an X–OFF character (hex 13) when entering the off line state or when the buffer is almost full.

DTR (Data Terminal Ready) – Control signal from the printer. (Subject to configuration.) Configurations include: always true, always false, true if on line and buffer not full, and true if off line or buffer almost full. When the printer is off line, or when its buffer is almost full, DTR is toggled. When the printer is ready to receive data, DTR is toggled back.

ETX/ACK – With ETX/ACK protocol selected, the printer interface operates in a block structured mode. The host sends a block of data in response to an ACK character (hex 06) sent from the printer. The host marks the end of the block of data with an ETX character (hex 03). When the printer recognizes the ETX character, the printer prints the data block and checks the space available in the buffer. If space is available for the next block of data, the printer sends ACK to the host. If space is not available, the printer withholds ACK until sufficient space is available.

ACK/NAK – With ACK/NAK protocol selected, the printer responds as described for ETX/ACK protocol except the printer monitors the received data for parity error. If a parity error is detected, a NAK character is transmitted to the host upon receipt of the ETX character. The host is expected to repeat the data transmission.

RS–232 INTERFACE ERROR – With an odd or even parity check in effect, an erroneous character shall be replaced with a question mark (?). If a parity error is detected, a NAK character (hex 15) is transmitted to the host when the ACK/NAK protocol is selected. When parity is not checked, parity errors are ignored and the characters are printed as received. Parity checking is a configuration option selected from the control panel. When a framing error occurs, an exclamation point (!) will be printed. When a data overrun error occurs, an asterisk (*) will be printed. After 20 successive errors have been received, a line feed is added which forces printing to occur.

RTS (Request To Send) – Control signal from the printer. Subject to configuration. Refer to DTR above for detailed configuration actions.

Reverse Channel (RC) – Control signal from the printer. Subject to configuration. Refer to DTR above for specific configuration actions. (Reverse Channel is not an official RS–232C signal; it is included for compatibility with earlier *Printronix* products.)

RS–232 Serial Interface Configuration

The printer is configured at the factory according to the specified interface as shown in the Configuration chapter. However, the interface configuration parameters can be changed. The following configuration parameters can be verified or changed as necessary to meet specific application requirements:

- Input Buffer Size (selected from the Application Compatibility menu; refer to the Configuration chapter)
- Data Protocol of hardware (DTR, Reverse Channel [RC], or RTS), X−ON/X−OFF, ACK/NAK or ETX/ACK
- Data Rate (Baud rate selected from the control panel; external clock jumper selected)
- Data Word Length (7 or 8 Bits)
- Stop Bits (1 or 2 Bits)
- Parity (Odd, Even, or None)
- Bit 8 Function (Font Select, PI Line, or Ignore)
- CD and DSR signal (Enable or Disable)
- CTS and DSR signal (Enable or Disable)
- Data Terminal Ready response logic
- Request to Send response logic
- Reverse Channel response logic

These parameters are displayed under the Application Compatibility/Host Interface/Serial RS−232 submenu selectable from the control panel (except for external clock selection as noted above). Refer to the Control Panel Configuration diagram in the Configuration chapter for detailed information on selecting the various parameter values.

NOTE: Do not use the bit 8 function to set the PI line if the host does not use it for paper control; rapid paper slewing may occur.

CHAPTER 8

ROUTINE SERVICE & DIAGNOSTICS

Introduction

The P9012 printer requires little maintenance other than regular general cleaning. Periodically remove excess paper chaff and dust from the ribbon and paper paths. If print quality or paper motion deteriorates seriously, contact your authorized service representative for prompt attention.

This chapter presents the following information:

- Cleaning
- Printer Self−Tests
- Fault Messages
- Hex Code Printout

Cleaning

The printer requires periodic cleaning to ensure efficient operation and clear print quality. Clean the printer approximately every three months or after 250 hours of operation. If the printer is located in a particularly dusty area, or is used for heavy duty printing, clean the printer more often.

❑ WARNING ❑

Disconnect the power source before cleaning the printer.

❑ WARNUNG ❑

Vor dem Säubern des Druckers ist die Netzverbindung zu unterbrechen.

Exterior Cleaning

Clean the cabinet exterior with a soft cloth and mild detergent. (Dishwashing liquid works well.) Do not use abrasive powders or strong cleaning agents. The clear windows may be cleaned with plain water or mild window cleaner. Always apply the cleaning solution to the cloth; never pour the cleaner directly onto the printer.

Interior Cleaning

Paper chaff and ink accumulation inside the printer is normal during printer operation. However, excessive paper chaff and ink accumulation can degrade printer performance and print quality. Most paper chaff accumulates around the ends of the platen and ribbon path. An optional cleaning kit is available from your authorized *Printronix* representative. To clean the interior of the printer, perform the following steps and refer to Figure 8–1.

1. Turn off the printer power, unplug the printer, and raise the printer cover.

2. Fully raise the Forms Thickness Adjustment Lever (A) to open the platen.

3. Remove all paper, ribbon and spools.

4. Using a soft–bristled brush, clear paper chaff from the paper path and platen ends (B).

5. Using the soft–bristled brush, clear paper chaff and dust from the ribbon guides (C).

❑ CAUTION ❑

Use caution when brushing in the hammer tip area. A metal brush handle can damage the hammer tips.

❑ VORSICHT ❑

Sehr vorsichtig um den Hammerspitzenbereich herum bürsten. Ein Metallbürsten handgriff könnte die Hammerspitzen beschädigen.

6. Lift the paper scale (D) on top of the ribbon deck. While gently pressing the ribbon mask (the thin metallic strip) toward the platen (E), carefully brush debris from the hammer tip area. Do not allow the metal neck on the brush (from the optional cleaning kit) to touch the hammer tips.

7. Using the plastic nozzle attachment on any commercial vacuum cleaner hose, gently vacuum the paper chaff and dust from the printer base pan (F). Carefully vacuum the hammer bank and surrounding area. Use caution when vacuuming the paper or ribbon path.

❑ CAUTION ❑

Use caution when using the cleaning nozzle in the hammer tip area. Do not insert the nozzle more than 3/4 inch into the hammer bank area or damage may result.

❑ VORSICHT ❑

Sehr vorsichtig sein, wenn man die Reinigungsdüse in dem Hammerspitzenbereich benutzt. Die Düse nicht mehr als 3/4 Zoll tief in den Hammerbankbereich einschieben, da sonst Schaden entstehen könnte.

8. While gently pressing the ribbon mask toward the platen, carefully vacuum the hammer bank area in a slow, left–to–right sweeping motion. Do not allow the vacuum nozzle to touch the hammer tips.

9. Gently vacuum between the hammer bank cover and the ribbon mask (the hammer bank cover is secured to the ribbon mask).

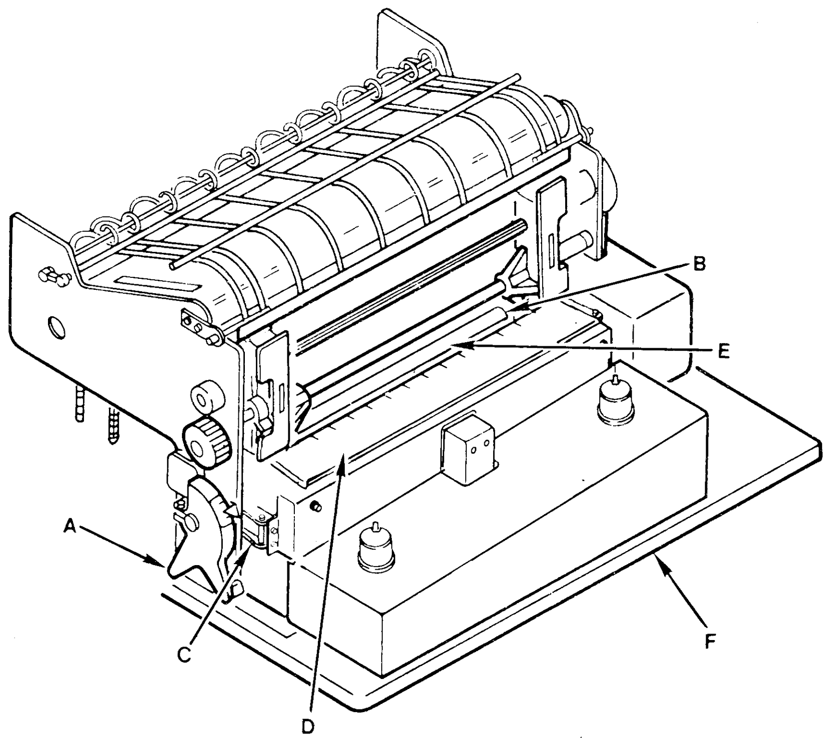


Figure 8–1. Interior Cleaning

10. Using a soft cloth *lightly* moistened with alcohol, remove ink or dirt from the platen. Do not let alcohol drip into the hammer bank.

Cleaning the Paper Motion Detector

The paper motion detector, located at the bottom of the left tractor gate, checks for jammed or incorrectly loaded paper. If excessive paper chaff or dust accumulates in this area, normal operation may be interrupted.

To clean the paper motion detector, perform the following steps and refer to Figure 8–2.

1. Open the left tractor gate (A).
2. Using the soft–bristled brush, clean the paper chaff and dust from the paper motion detector (B). Vacuum the area to clear all dust and paper chaff particles.
3. Close the tractor gate.
4. Reload paper and ribbon.
5. Close the Forms Thickness Adjustment Lever to the appropriate paper thickness position.
6. Close the printer cover, plug in printer, turn on printer power, and place the printer on line.

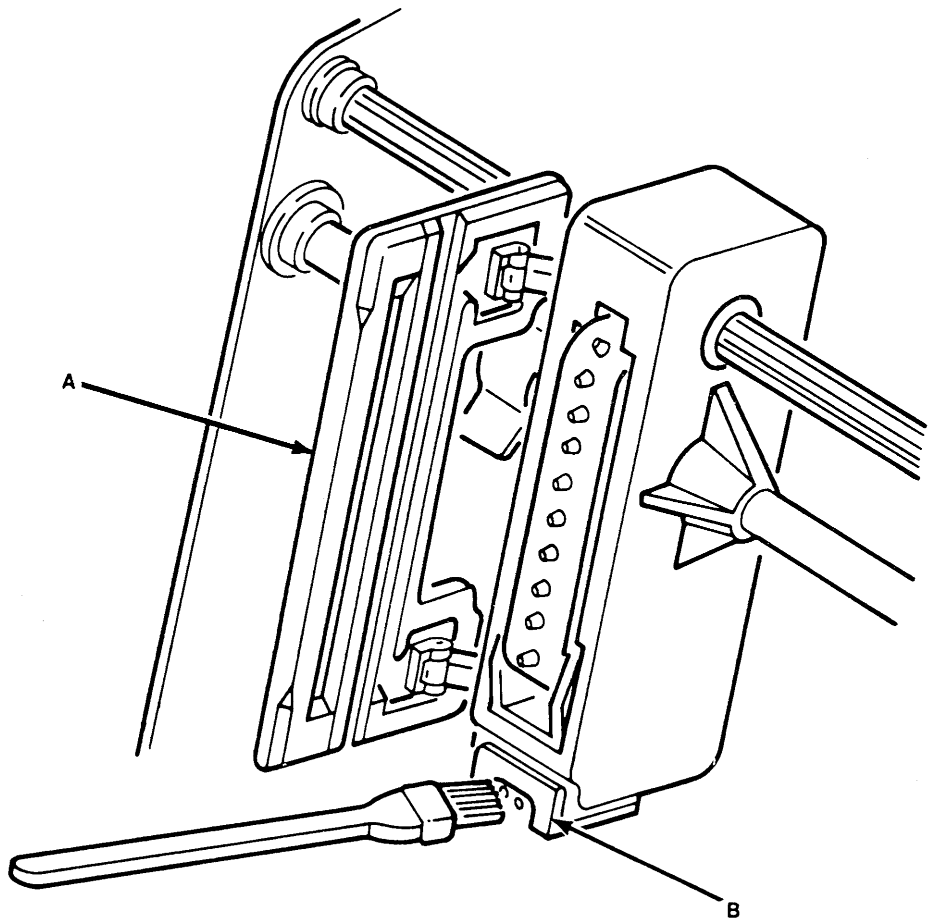


Figure 8−2. Cleaning the Paper Motion Detector

Printer Self–Tests

The printer contains several self–tests that are helpful in evaluating and maintaining optimum printer performance. Each of these tests may be initiated from the DIAGNOSTICS/PRINTER TEST 8 INCH WIDTH or DIAGNOSTICS/PRINTER TEST FULL WIDTH configuration menus. Self–tests may periodically halt shuttle activity for long time intervals. Available self–tests are as follows:

- Shift Recycle
- All E's
- E's plus TOF
- All H's
- Underline Only
- Black Plot
- Shuttle / Ribbon
- Demonstration Test

Shift Recycle – a "sliding" alphanumeric pattern useful in identifying missing or malformed characters, improper vertical alignment, or vertical compression.

All E's – a pattern of all uppercase letter E's useful in identifying missing characters, misplaced dots, smeared characters, improper registration of left and right moving strokes (phasing), or light/dark character variations.

E's plus TOF – a pattern of all E's followed by a form feed to the next page top–of–form, useful in identifying high speed paper motion feeding problems.

All H's – a pattern of all uppercase letter H's useful in detecting missing characters, misplaced dots, smeared characters, or improper phasing.

Underline Only – an underline pattern useful in identifying vertical hammer tip misalignment.

Black Plot – all odd dot positions are printed and followed by periodic pauses in shuttle activity. This is useful for identifying horizontal hammer tip misalignment.

Shuttle / Ribbon – a test that verifies proper operation by exercising shuttle and ribbon motion. This is useful for identifying spooling and ribbon guide misalignment.

Demonstration Test – a test of all print attributes.

Running the Self–Tests

To run the self–tests, perform the following steps.

1. Place the printer off line and raise the printer cover.
2. Press MENU DOWN; repeatedly press NEXT or PREV until DIAGNOSTICS is displayed.
3. Press MENU DOWN, then repeatedly press NEXT or PREV until either PRINTER TEST FULL WIDTH or PRINTER TEST 8 INCH WIDTH message is displayed.

4. To select one of the 8 INCH WIDTH or FULL WIDTH paper tests, press MENU DOWN then repeatedly press NEXT or PREV until the appropriate test is displayed. Tests include shift recycle, all Es, and others.

5. Press RUN/STOP to begin the selected self−test; press RUN/STOP again to stop it.

   NOTE: Any data remaining in the buffer will be printed before the self−test begins.

Examine the print quality. The characters should be horizontally and vertically aligned and correctly formed. If print quality problems exist, contact your authorized service representative.

6. Press CLEAR to place the printer off line. The display will read OFFLINE READY.

7. Close printer cover and place the printer on line.

Fault Messages

Fault messages and their explanations are listed in Table 8−1. Fault messages indicate the nature and location of user− and service−correctable faults. After correcting a user−correctable fault, press CLEAR to resume printer operation.

Service correctable faults are indicated on the message display by an asterisk (*) next to the fault message. If a fault message appears, first press the CLEAR switch. If the printer returns to OFFLINE READY after a few seconds, the fault message was a false indication, and printing may be continued. If a fault occurs during a paper slew, the paper motion will complete for all faults. If the fault message re−appears after pressing CLEAR, turn the printer off and contact your authorized service representative.

Hex Code Printout

The hex code printout (often called a "hex dump") are useful for debugging when troubleshooting printer data reception problems. Hex dumps list ASCII character data received from the host with the corresponding two−digit hexadecimal code. Printable characters print their assigned symbol; nonprintable characters are indicated with a period symbol. A "p" before the hex code indicates an active Paper Instruction (PI) line; a blank space before the hex code indicates an inactive PI line. To print the data stream received from the host computer in hex code with ASCII character equivalents, perform the following steps.

1. Place the printer off line and raise the printer cover.

2. Press MENU DOWN; repeatedly press NEXT or PREV until DIAGNOSTICS is displayed.

3. Press MENU DOWN, then repeatedly press NEXT or PREV until the PRINT DATA STREAM IN HEX CODE message is displayed.

4. Press MENU DOWN; the display will show OFFLINE HEX DUMP.

5. Press ON LINE. The display will indicate that the printer is on line and in hex dump mode.

6. Send the data from the host; the hex dump will print.

7. Press ON LINE again to stop the hex dump. The display will read OFFLINE HEX DUMP.

8. Press CLEAR to return printer to OFFLINE READY.

9. Close printer cover and place the printer on line.

   NOTE: Any data remaining in the buffer will be printed before the hex code printout starts.

Table 8–1. Fault Messages

Fault Displayed	Operator Correctable?	Explanation	Corrective Action
FAULT CONDITION PAPER OUT	Yes	*Paper out*	Add paper.
FAULT CONDITION PLATEN OPEN	Yes	*Platen open*	Close platen (Forms Thickness Adjustment Lever).
FAULT CONDITION PAPER JAM	Yes	*No paper motion*	Check for and remove jammed paper in paper path. Clean the paper motion detector.
FAULT CONDITION SHUTTLE STALL	Yes	*No shuttle movement or wrong speed*	Check for shuttle obstruction or twisted ribbon. If fault is not apparent, contact an authorized service representative.
FAULT CONDITION COVER OPEN	Yes	*Hammer bank cover open*	Close cover.
FAULT CONDITION RIBBON	Yes	*Jammed ribbon*	Replace ribbon.
FAULT CONDITION CHANGE RIBBON *(displays only if RibbonMinder is enabled)*	Yes	*Ribbon is out of ink*	Replace ribbon.
FAULT CONDITION COOLING	Yes	*Cooling blower failure*	Allow printer to cool. If fault recurs, contact an authorized service representative.
FAULT CONDITION NOVRAM *	No	*Non–volatile memory fault*	Contact an authorized service representative.
FAULT CONDITION HAMMER DR PCB X *	No	*Failure or impending failure of hammer driver/coils*	Contact an authorized service representative.
FAULT CONDITION FONT PROM *	No	*Font PROM incompatibility*	Contact an authorized service representative to have new PROM set installed.
FAULT CONDITION PROGRAM PROM *	No	*Partial program PROM failure*	Contact an authorized service representative to have new PROM set installed.
Lamps/LEDs flash rapidly at powerup	No	*RAM failed initialization test*	Contact an authorized service representative.
** Corrective action required by authorized service representative*			

CHAPTER 9

RIBBONMINDER ™

Introduction

The RibbonMinder (patent pending) ensures quality printing by determining when a ribbon should be changed. The RibbonMinder monitors ink consumption by analyzing printer hammer action. It is designed to alert the operator before the print quality falls below a certain level. RibbonMinder configuration parameters can be set to meet the specific requirements of any job. In this way, you can determine at what level print quality is no longer acceptable. When the print quality reaches this point, a WHEN WORN ACTION will occur. The printer can be set to either stop printing at this point, or to display a message indicating it is time to change the ribbon. Replacing the ribbon when the WHEN WORN ACTION occurs will prevent the production of unreadable documents and bar codes.

This chapter provides step–by–step instructions to use the RibbonMinder function. Application hints and shortcuts are included at the end of the chapter. Words and phrases in uppercase letters represent the actual buttons on the printer control panel and messages that appear in the display.

Refer to the RibbonMinder diagram on page 9–13 and become familiar with the menu structure and messages displayed when using RibbonMinder features.

Overview

The RibbonMinder operates much like the fuel gauge in an automobile. In a car, the fuel gauge indicates how much fuel remains. With RibbonMinder, the message display on the printer control panel indicates how much usable ink remains in the ribbon. This feature occurs without operator attention once it has been set. It may also be controlled through a host interface.

When the ribbon is new, the message display on the printer control panel indicates the ribbon life is at 100%.

```
ON LINE          100%
DP AT 10 CPI
```

Typical new ribbon display

As printing continues, the percentage of usable ink remaining in the ribbon continues to fall.

```
ON LINE           74%
DP AT 10 CPI
```

Ribbon ink is being consumed

```
ON LINE            8%
DP AT 10 CPI
```

Ribbon life is approaching end

The RibbonMinder feature detects when no usable ink remains. The message display will indicate 0% and the printer will alert you. At this point, the printer is typically configured to stop printing, declare a RIBBON FAULT, and display a CHANGE RIBBON message.

FAULT CONDITION CHANGE RIBBON	CHANGE RIBBON message at 0%

Finally, the RibbonMinder also allows you to set a new JOB RATE value for the next job. This value is based on the type of job to be run by the printer. The RibbonMinder also provides an ANALYZE JOB mode to easily calibrate the RibbonMinder for each job that the printer will run, in order to determine the value of the JOB RATE.

CURRENT 350 NEW RATE 450	SET JOB RATE menu
ON LINE 425A DP AT 10 CPI	ANALYZE JOB RATE display

NOTE: All RibbonMinder parameters (Job Rate, Ribbon Size, When Worn Action, Enable/Disable) are automatically saved in NOVRAM when selected.

Analyzing a Job

Every job needs to be analyzed to determine its JOB RATE, and the JOB RATE must be set for the RibbonMinder to work correctly. The JOB RATE describes the rate at which a job wears out the ribbon. JOB RATE values can range from 0 (no wear) to 1000 (the highest possible rate of ink consumption).

It is only necessary to analyze a JOB RATE for a particular job once, provided the JOB RATE is recorded for future use. For example, if you know that the same job will be run more than once, analyze the job once and record the JOB RATE for the next time that job is run. A new ribbon must be used when analyzing a job. The printer status lamps will flash until a new ribbon is installed.

1. **Unlock the Control Panel**

   Place the printer OFFLINE. Unlock the printer configuration by simultaneously pressing MENU UP and MENU DOWN until the message ENTER SWITCH NOT LOCKED appears briefly in the message display.

   ```
   ENTER SWITCH
   NOT LOCKED
   ```

2. **Enable the RibbonMinder Monitor Feature**

   From the OFFLINE READY display, press MENU DOWN until the RIBBON LIFE menu options are displayed. Press NEXT or PREV repeatedly until ENABLE/DISABLE appears on the display. Press MENU DOWN to display ACTION ENABLE. Each time NEXT is pressed at this level, the function will alternate between ENABLE and DISABLE. Press ENTER. If the asterisk does not appear, refer to Application Hints on page 9–12.

```
RIBBON LIFE       100%
ENABLE ACTION  *
```

3. **Enter Analyze Job Mode**

From the OFFLINE READY display, press MENU DOWN to re–enter the RIBBON LIFE menu. Press NEXT repeatedly until ANALYZE JOB appears on the display.

```
RIBBON LIFE
ANALYZE JOB
```

4. **Enable Analyze Job Mode**

Press ENTER. The message below should appear in the message display. A message to change to a new ribbon will appear if the ribbon was not just changed.

```
RIBBON LIFE   1000
CHANGE RIBBON
```

5. **Select When Worn Action**

From the OFFLINE READY display, press MENU DOWN to re–enter the RIBBON LIFE menu. Enter the WHEN WORN ACTION menu by pressing NEXT until WHEN WORN ACTION appears in the display. Press MENU DOWN, then NEXT repeatedly to select STOP PRINTER action, AUD/VIS ALARM action, or VISUAL ALARM action. The selection will appear in the display with the RIBBON LIFE job rate. Press ENTER after the desired option appears in the display. If the asterisk does not appear, refer to Application Hints on page 9–12.

RIBBON LIFE 1000 AUD/VIS ALARM *	Display if Aud/Vis alarm is chosen
RIBBON LIFE 1000 VISUAL ALARM *	Display if visual alarm is chosen
RIBBON LIFE 1000 STOP PRINTER *	Display if stop printer is chosen

6. **Select Ribbon Size**

From the OFFLINE READY display, press MENU DOWN to re–enter the RIBBON LIFE menu. Press NEXT or PREV repeatedly until SET RIBBON SIZE appears on the display. Press DOWN and then NEXT until the desired ribbon size is displayed. The RIBBON SIZE is the actual capacity of the ribbon. The most common ribbon size is 60 yards long with a spool diameter of approximately 4 inches. If, for example, the new ribbon is 100 yards long, the capacity value is 100. To increase or decrease the ribbon size in whole−number increments, press NEXT or PREV, respectively, until the desired value is reached. Press ENTER. If the asterisk does not appear, refer to Application Hints on page 9−12. The following illustrates a sample SET RIBBON SIZE display:

```
CURRENT      60
NEW SIZE     60*
```

7. **Install a New Ribbon**

Install a new ribbon appropriate to the job size before starting to analyze a new job. Press CLEAR to clear any fault conditions that occurred while changing the ribbon.

```
OFFLINE    1000A
READY
```

8. **Begin Printing Job**

Press ON LINE to begin the job printing. The analysis number will begin at 1000A with a fresh ribbon, and will begin to decline as the ribbon becomes worn. Typically, the number will not begin to decrease until more than 200 pages are printed.

The same job can be printed repeatedly in order to compute a JOB RATE. The ribbon should be used to the point where the operator decides that ribbon replacement is necessary. The ribbon should be considered worn out if the print quality of any part of the page is unacceptable. The following is a typical message display after considerable ink consumption.

```
ON LINE         400A
DP AT 10 CPI
```

9. **End of Ribbon Life Reached**

When the quality of the print is no longer acceptable, press ON LINE again to stop the printer. If the message indicates there is DATA in the BUFFER, press PAPER ADV to finish printing the data.

```
OFFLINE         400A
READY
```

10. **Record the Job Rate**

The calculated JOB RATE value is continuously shown on the display. While a job is being analyzed, the JOB RATE is displayed with an “A” after it. Record the JOB RATE value for future use. To enter this calculated JOB RATE for RibbonMinder use from the OFFLINE READY prompt, enter the SET JOB RATE submenu by consecutively pressing MENU DOWN and then NEXT.

ANALYZE JOB	
NEW RATE	400

Press ENTER to enter this rate as the new job rate. The message display will read:

CURRENT	400
NEW RATE	400

11. **Replace Worn Ribbon**

    Install a new ribbon once the ribbon becomes worn. Press CLEAR to clear the PLATEN OPEN fault message.

    OPTIONAL: To lock the printer configuration, press MENU UP and MENU DOWN simultaneously until ENTER SWITCH LOCKED appears briefly in the message display.

To quickly analyze a job:

1. Generate a sample printout of the job to be run.
2. Identify the vertical dot column with the most printed dots.
3. Compare the number of dots printed with the total number of dots that *could have* been printed. Do not count the horizontal dot rows that are not printed due to paper movement (horizontal dots rows without dots). From this number, determine the percentage of printed area.
4. Multiply the percentage by 10. This is the job rate.
5. Perform steps 1 through 6, 10, and 11 described above to enter the RibbonMinder menu, RIBBON SIZE and the JOB RATE.

If the printer power is cycled while in the Analyze Job Mode, the printer will exit the Analyze Job Mode. A print job can be stopped and restarted without losing its position in the Analyze Job Mode.

Running a Job

The RibbonMinder works without attention after it has been set up for a job. To run a job, perform the following steps.

1. **Replace Ribbon if Worn**

   Install a new ribbon if the ribbon life is 0% or negative, or if the RibbonMinder function has been disabled.

2. **Unlock the Control Panel**

If not at the OFFLINE READY prompt, press CLEAR until OFFLINE READY appears. Unlock the printer configuration by simultaneously pressing MENU UP and MENU DOWN until the ENTER SWITCH UNLOCKED prompt appears briefly in the display.

```
ENTER SWITCH
UNLOCKED
```

3. **Enable the RibbonMinder Monitor Feature**

From the OFFLINE READY display, press MENU DOWN to enter the RIBBON LIFE menu. Press NEXT repeatedly until ENABLE/DISABLE appears on the display. Press MENU DOWN and NEXT to display ENABLE ACTION. Each time NEXT is pressed at this level, the function will switch between ENABLED and DISABLED. Press ENTER. If the asterisk does not appear, refer to Application Hints on page 9–12.

```
RIBBON LIFE      1000
ENABLE ACTION  *
```

4. **Enter the SET JOB RATE**

From OFFLINE READY, press MENU DOWN to re–enter the RIBBON LIFE menu. Press NEXT repeatedly until SET JOB RATE appears on the display. Press DOWN to display the current job rate. The display message will now show the value last selected.

```
CURRENT         400
NEW RATE        400*
```

The JOB RATE can be set from the host. If a new JOB RATE is not entered, enter a previously recorded JOB RATE.

5. **Select New JOB RATE**

Select the appropriate JOB RATE by pressing NEXT or PREV until the correct JOB RATE appears in the display. This JOB RATE is obtained by analyzing the job. Press ENTER to enter this JOB RATE. If the NEW RATE value displayed is larger than desired, decrement the NEW RATE by pressing PREV (Press and hold to quickly advance the count); press ENTER. An asterisk next to the selection indicates that it has been entered. If an asterisk does not appear, refer to Application Hints on page 9–12.

6. **Choose the WHEN WORN ACTION**

Choose what printer action should occur when the ribbon life reaches 0%. From the OFFLINE READY display, press MENU DOWN to re–enter the RIBBON LIFE menu. Press NEXT repeatedly until WHEN WORN ACTION appears on the display.

To select the STOP PRINTER action when the ribbon is worn, press MENU DOWN; when STOP PRINTER is displayed, press ENTER.

RIBBON LIFE 100% STOP PRINTER *

To select the AUDIO/VISUAL ALARM action when the ribbon is worn, press NEXT; when AUD/VIS ALARM is displayed, press ENTER.

RIBBON LIFE 100% AUD/VIS ALARM *

To select the VISUAL ALARM action, press NEXT; when VISUAL ALARM is displayed, press ENTER.

RIBBON LIFE 100% VISUAL ALARM *

7. **Reset for a New Ribbon**

If a new ribbon was *not* installed, skip this step. If a new ribbon was installed and is the same size as the previous one, re–enter the RIBBON LIFE menu by pressing CLEAR, then MENU DOWN until NEW RIBBON submenu appears in the message display. Press ENTER.

RIBBON LIFE 100% NEW RIBBON

8. **Check for Proper Ribbon Size**

If the new ribbon is a different size than the previous one, set the new size. Consecutively press CLEAR to return to OFFLINE READY, then re–enter the RIBBON LIFE menu. Press NEXT repeatedly until SET RIBBON SIZE appears on the display. Press MENU DOWN to display the current size. The display message will be CURRENT XXXX NEW SIZE XXXX.

Select the appropriate value by pressing NEXT until the number appears in the message display. Press ENTER to enter this new value. The message below should appear in the message display. A message to change the ribbon will appear if the ribbon was not just changed.

CURRENT	60
NEW SIZE	80

OPTIONAL: To lock the printer configuration, press MENU UP and MENU DOWN simultaneously until ENTER SWITCH LOCKED appears briefly in the message display.

9. **Go On Line to Begin Printing**

Press ON LINE to begin printing. Notice the 100% ribbon life value in the upper right corner of the display. This display shows the remaining usable ribbon life as the job progresses. The ribbon life will decrease as the ribbon consumes ink. The following example illustrates the display as the job progresses:

ON LINE	95%
DP AT 10 CPI	

10. **When Ribbon Life Reaches 0%**

Printing can continue until the remaining usable ink reaches 0%. At this point, if the STOP PRINTER action has been selected, the printing will stop, the printer will go off line, and a CHANGE RIBBON message will appear in the message display.

FAULT CONDITION
CHANGE RIBBON

11. **Replace Ribbon**

Open the Forms Thickness Adjustment Lever (platen). Remove the old ribbon. Install a new ribbon and return the platen to its proper setting. Press CLEAR. The Ribbon Life percentage is reset to 100%.

OFFLINE	100%
READY	

12. **Continue Printing the Job**

Press ON LINE to resume printing the job. The RibbonMinder will continue to monitor ink consumption and display the remaining ribbon life.

Multiple Jobs on the Same Ribbon

NOTE: The job rate for each job can be set automatically through the host interface as discussed on page 9–10, or set manually as discussed in this section.

The RibbonMinder function may be used to run more than one job on the same ribbon. To do this, the JOB RATE of each job must be known before printing. To use the function with more than one job and more than one JOB RATE, follow the procedures for initially setting up the RibbonMinder function. At the completion of each job, change the JOB RATE before starting the new job.

1. **Unlock Printer Configuration**

If the printer configuration is currently locked, place the printer OFFLINE. Unlock the printer configuration by pressing MENU UP and MENU DOWN simultaneously until the message ENTER SWITCH NOT LOCKED appears briefly in the message display.

ENTER SWITCH NOT LOCKED	Message appears briefly

2. **Enter SET JOB RATE mode**

From OFFLINE READY, press MENU DOWN to enter the RIBBON LIFE menu. Press NEXT to enter the SET JOB RATE. The CURRENT VALUE at this point corresponds to the previous job.

CURRENT	375
NEW RATE	375 *

3. **Change to New Rate**

Set the NEW RATE value to equal the rate of the next job. The NEXT switch will increase the value of the NEW RATE. Pressing PREV will decrease the value of the NEW RATE.

CURRENT	375
NEW RATE	280

4. **Select the NEW RATE value**

Press ENTER to enter this new value. The JOB RATE can also be sent from the host.

CURRENT	280
NEW RATE	280 *

OPTIONAL: To prevent unauthorized changes to the RibbonMinder JOB RATE, the printer configuration should be relocked. To lock the printer configuration, place the printer OFFLINE; then press MENU UP and MENU DOWN simultaneously until ENTER SWITCH LOCKED appears briefly in the message display.

Changing a Ribbon Early

Occasionally, a ribbon malfunctions and must be replaced before the ink has been depleted. This may occur with ribbons that have been snagged, folded, or otherwise damaged. Whenever the need arises to change a ribbon early, replace the defective ribbon with a new one and reset the ribbon life to 100% according to the following procedure.

1. **Enter NEW RIBBON mode**

Place the printer OFFLINE. Press MENU DOWN to enter the RIBBON LIFE menu. Press NEXT until NEW RIBBON is displayed (ignore any brief messages that indicate ENTER SWITCH LOCKED; the printer configuration does not have to be unlocked for an operator to reset the ribbon life for a new ribbon).

RIBBON LIFE	43%
NEW RIBBON	

2. **Reset for New Ribbon**

   Press ENTER to reset for a new ribbon. The display message will indicate CHANGE RIBBON.

RIBBON LIFE 100%
CHANGE RIBBON

3. **Install New Ribbon**

   Install a new ribbon and press CLEAR to clear any fault conditions that occurred while changing the ribbon.

OFFLINE 100%
READY

4. **Continue Printing**

   Continue printing the interrupted job by placing the printer ON LINE.

5. **Change Ribbon Size**

   If the new ribbon is a different size, refer to the Running a Job on page 9–5 for instructions on how to change the ribbon size.

Host Control

The RibbonMinder function can be controlled by host interface using the following control code sequences. Additional information and a program example is provided in the Programming chapter.

NOTE: If your printer is in Serial Matrix emulation, substitute ESC for the Special Function Control Character (SFCC) being used.

SET JOB RATE

Command: **SFCC r J NNNN E**

where – NNNN is the JOB RATE value between 0 and 1000 expressed as a decimal number having between one and four digits. Each individual digit of the value is represented by the corresponding hex code. For example, if the JOB RATE value is 341, **NNNN** will be the ASCII characters 3 (33 hex), 4 (34 hex), and 1 (31 hex). The control code sequence will be CHR$(1);"rJ341E";

Examples of ASCII Hex values: 01 72 4A 33 34 31 45

WHEN WORN ACTION

Command: **SFCC r A x**

where – the value of **x** determines the printer action as follows:

STOP PRINTER	**S**	(Hex 53)
AUD/VIS ALARM	A	(Hex 41)
VISUAL ALARM	**V**	(Hex 56)

Examples of ASCII Hex values: 01 72 41 53

ENABLE/DISABLE

SFCC r E ENABLE printer action. Examples of ASCII Hex values: 01 72 45

SFCC r D DISABLE printer action. Examples of ASCII Hex values: 01 72 44

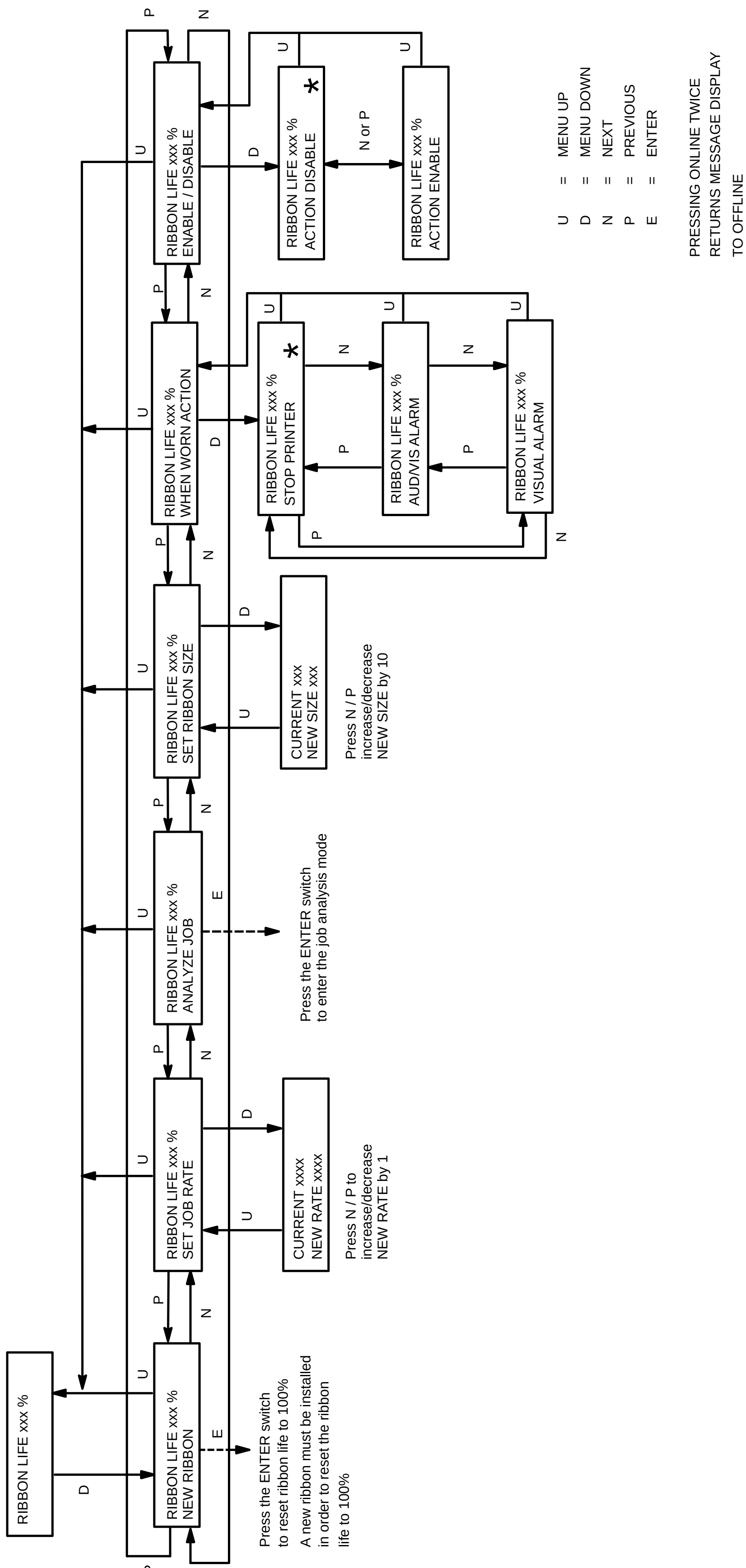
Procedure

To set up RibbonMinder for interface with a host:

1. Install a new ribbon.
2. Unlock the printer configuration.
3. Check the ribbon size and change if necessary.
4. Relock the printer configuration.
5. Press ON LINE to begin printing. The commands which supply JOB RATE, WHEN WORN ACTION, and the ENABLE feature must be sent from the host prior to printing. These commands may be sent from a remote computer or embedded in the job before printing the job.

Application Hints

- To decrease a value in the menu, press PREV.
- Parameters cannot be changed from the control panel while the printer configuration is locked. The ENTER SWITCH LOCKED message will appear briefly if you attempt to change a parameter while the ENTER switch is locked.
- JOB RATES do not change when the ribbon size changes. The RIBBON SIZE must be reset when the size of the ribbon changes.
- JOB RATES can be changed without affecting printing quality.
- JOB RATES must always be determined prior to running a job.
- Changing the RIBBON SIZE (by entering a new value and pressing ENTER) will always reset the new ribbon life value to 100%.
- To clear a CHANGE RIBBON message, either change the ribbon and press CLEAR, or DISABLE the RIBBON LIFE function. The CHANGE RIBBON message will reappear once the function is enabled again if the ribbon is worn. The printer status lamps will flash if the ribbon is not changed.
- To return to the OFFLINE/READY prompt, press CLEAR until OFFLINE/READY appears in the message display.
- Change the parameters in accordance with each new job.
- The ENABLE/DISABLE, JOB RATE, and WHEN WORN ACTION features can be set through the host interface.
- If message display indicates to install a new ribbon, and the print job is one page short of completion, press ON LINE to print the last page.
- Record the JOB RATE determined while analyzing a job. This value is necessary each time the RibbonMinder function is used on a job.
- When analyzing a job, a new ribbon must be installed.
- While the RibbonMinder is disabled, the ribbon life value will not be displayed in the ON LINE or OFFLINE states, or in any configuration menu.
- All RibbonMinder parameters (JOB RATE, RIBBON SIZE, WHEN WORN ACTION, ENABLE/DISABLE) are automatically saved in NOVRAM when selected.



RibbonMinder Diagram

CHAPTER 10

MULTINATIONAL CHARACTER SETS

Introduction

Four basic character set choices are available and selected from the control panel: IBM PC, Multinational, DEC Multinational, and ECMA 94 Latin 1 which includes an extended character set. Character matrix tables for each character set and the corresponding international language substitution table are provided in this chapter.

This chapter discusses the following:

- Selecting the Character Set and Language
- Selecting Extended Character Set ECMA
- OCR−A and OCR−B
- Downloading Languages and Characters
- Character Address Table (Character Library)
- Numeric Character Location Listing
- Alphabetical Character Location Listing

Specific character set charts and international language substitution tables are provided in Appendix B.

Selecting the Character Set and Language

The character sets and languages within each character set are selected at the printer control panel and are illustrated in the Multinational Character Set diagram located on page NO TAG. Select the appropriate character set and language as follows:

1. At the control panel, cycle through the character set selections and select the desired character set.
2. Cycle through the international language selections available within the selected character set and select the language.

NOTE: The language selection can also be made from the host computer using PSET or ESC R. Refer to Character Set Select: International *in the Programming chapter for details.*

Selecting Extended Character Set ECMA

ECMA 94 Latin 1 is broken down into two parts: the Primary Set, defined from 20−7F hex, and the Extended Set, defined from 80−FF hex. The Extended Set may be one of several sets selectable from the control panel: Barcode, Multinational, Greek, Graphics, and Scientific.

The selection of the Extended Character Set also sets the print mode and pitch at which the Extended Character Set is printed. The print mode and pitch can be different for the Primary and Extended Character Sets. However, the Primary Set cannot be mixed with an Extended Set within the same line if the Extended Set is printing at a different print mode than the Primary Set.

When ECMA 94 Latin 1 has been selected from the control panel, the OSET command can be sent from the host to then select the extended portion of the character set. More information on the OSET command is provided in *Character Set Select: ECMA 94 Latin 1 Extended,* located in the Programming chapter.

OCR−A and OCR−B

OCR print modes are selected from the Print Mode feature at the Print Format (Level 1) of the Configuration Diagram shown in the Configuration chapter.

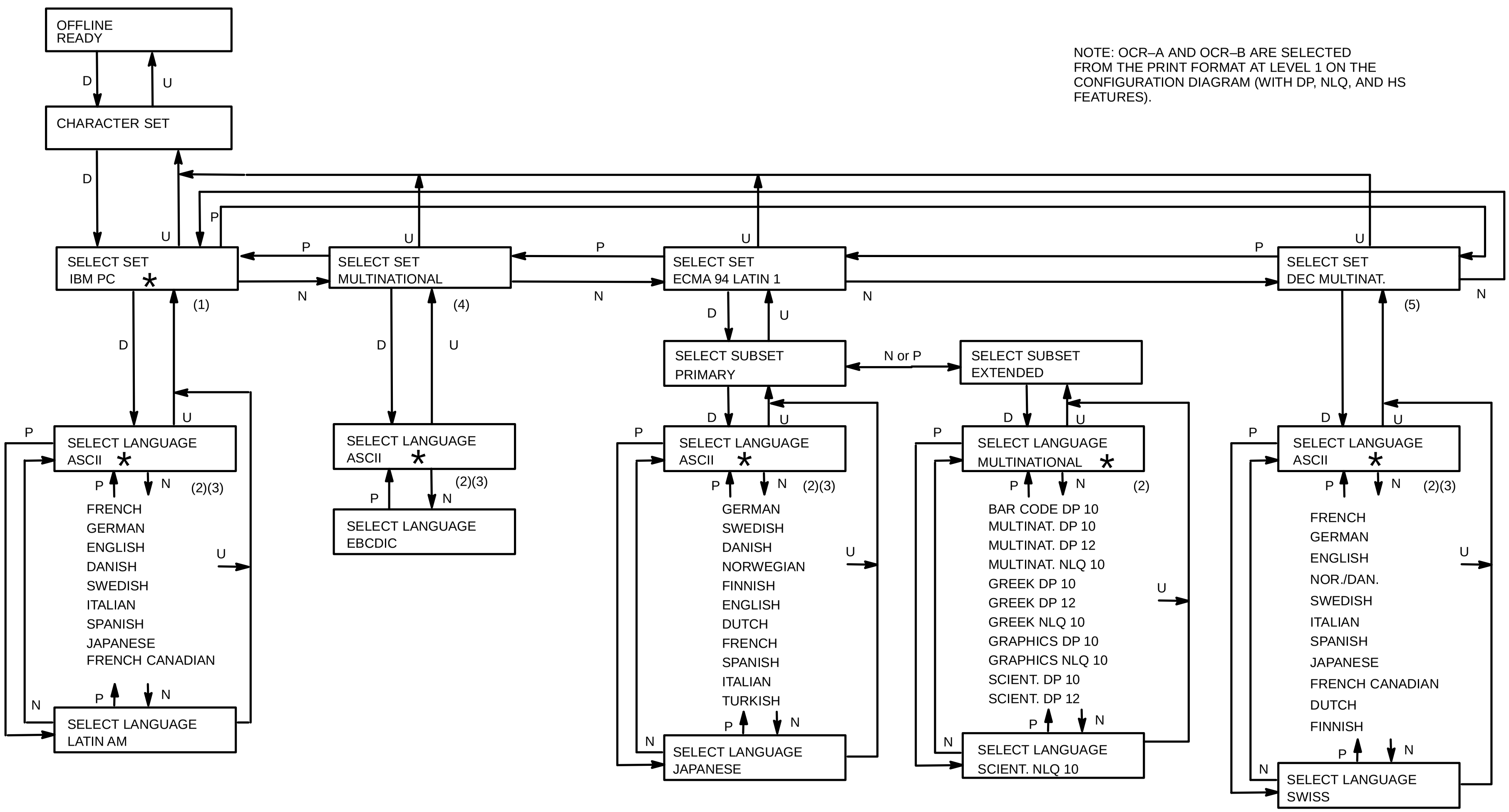
OCR print modes do not contain complete character sets. (OCR character set charts are located in Appendix B.) Available OCR−A standard characters are dictated by American National Standard Institute (ANSI) #X3.17−1981, and OCR−A international characters are in accordance with International Organization for Standardization (ISO) #646−1973. Available OCR−B standard and extended characters are dictated by ANSI #X3.49−1975. Undefined OCR characters are replaced with spaces. When an international language substitution is selected for a non−existent character, no substitution will occur.

Downloading Languages and Characters

Character substitution tables can be customized and stored until needed using two Downloading procedures. Using the Downloading a Language feature (ESC V) allows you to define and download a character substitution table which can be placed within the 224 printable symbol code points. Download a Character, activated by ESC c, allows at least six characters (depending on the character size(s)) to be defined and stored in NOVRAM. Refer to *Download a Language* and *Download a Character* in the Programming chapter.

The complete character library is shown in the Character Address Table on page NO TAG. The character library identifies each character's location in printer memory by its hexadecimal address value (see the Numeric Character listing starting on page 10−6 or the Alphabetical Character listing starting on page 10−18). International language substitutions are retrieved from this Character Address Table and substituted in the values shown on the international languages substitution tables. For example, while 7E hex is the Lowercase Beta symbol on the international substitution table for ECMA German, E1 hex is the actual address of this character in printer memory. All symbols are shown in 10 cpi, and do not represent the symbol in all print modes and pitches.

> *NOTE: The character examples provided in each character set are representative and not exact replications generated by the printer. In addition, not all characters are available in all print modes.*



(1) EXTENDED SUBSET is IBM PC GRAPHICS

(2) Menu selections vary when optional fonts are installed

(3) DOWNLOADED shall be displayed when a downloaded substitution table is active

(4) EXTENDED SUBSET is MULTINATIONAL

(5) EXTENDED SUBSET is DEC MULTINATIONAL

Multinational Character Set Diagram

Character Address Table (Character Library)

	00 0_	00 1_	00 2_	00 3_	00 4_	00 5_	00 6_	00 7_	00 8_	00 9_	00 A_	00 B_	00 C_	00 D_	00 E_
0	—	Ø		0	@	P	‘	p	Ç	É	á	░	└	╨	α
1	Ï	À	!	1	A	Q	a	q	ü	æ	í	▒	┴	╤	β
2	¿	È	″	2	B	R	b	r	é	Æ	ó	▓	┬	╥	Γ
3	♥	Ì	#	3	C	S	c	s	â	ô	ú	│	├	╙	π
4	◆	¶	$	4	D	T	d	t	ä	ö	ñ	┤	─	╘	Σ
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ
6	♠	Ò	&	6	F	V	f	v	å	û	ª	╢	╞	╓	μ
7	¨	Ù	′	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ
8		¤	(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ
9	Đ	¿	)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	Θ
A	Á	đ	*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω
B	Í	|	+	;	K	[	k	{	ï	’	¿	╗	╦	█	δ
C	Ó	[illegible]	’	<	L	\	l	¦	î	£	¿	╝	╠	▄	∞
D	Ú	‗	–	=	M	]	m	}	ì	¥	¡	╜	═	▌	φ
E	ý	×	.	>	N	^	n	~	Ä	₧	«	╛	╬	▐	∈
F	Ý	ø	/	?	O	_	o	ˇ	Å	ƒ	»	┐	╧	▀	∩

00 F_	01 0_	01 1_	01 2_	01 3_	01 4_	01 5_	01 6_	01 7_	01 8_	01 9_	01 A_	01 B_	01 C_	01 D_	01 E_
≡	Â	¿	'Ϊ	Λ	ς	⊆	∝	1/5	∇	‖	‖|	‖|	▮▮	ˈ	
±	Ê	¿	Ϊ	Ξ	1/11	⊇	‖	2/5	▷	▮	▮|	▮|	|▮▮	"	=
≥	Î	π	'Ϊ	Π	υ	⇔	⊥	3/5	◁	|	▮	‖	▮	ˈ	ˈ
≤	Ô	ı	'Ω	Τ	φ	∀	♃	4/5	▭	||	|▮	|||	|▮	"	Ч
ʃ	Û	Ğ	ά	Ψ	χ	∃	″	✓	☆	||	|▮	|||	|▮	Œ	┤
J	ꝏ	ğ	έ	γ	ψ	Ɛ	∓	♂	✱	▮|	▮▮	|‖	▮▮	œ	ʃ
÷	ꝏ	Ş	ή	ε	ω	Ƶ	-	♀	⌖	▮	▮	‖	▮	*	_
≈	ꝏ̃	ş	ί	ζ	∧	⊞	–	ƀ	└	▮	▮	‖|	▮	█	I
∘	ꝏ	ȋ	ϊ	η	∨	Ά	—	„	┘	▮	▮	▮|	▮	Ÿ	I
•	¾	'A	ΐ	ϑ	⊂	∫	—	℗	┐	▮	▮	▮|	▮	ꝏ	┴
·	1	'E	ό	ι	⊃	∮	†	◇	┌	|	|	▮	ˈ	ϒ	ȯ
√	3	'H	ύ	ϰ	⇐	ȣ	‡	♡	|	||	||	|▮	ˈ	ϒ̃	↑
ⁿ	′	'I	ϋ	λ	⇒	≃	✠	⌑	|	||	||	|▮	ˈ	1/8	↓
²	Ë	Ϊ	ΰ	ν	∴	≅	…	⬡	▮	▮|	||	▮▮	"	3/8	→
▪	¿	'Ϊ	ώ	ξ	∵	≠	1/3	□	|	‖	||	▮	ˈ	5/8	
;̄	®	'0	Δ	ϱ	∍	ƒ	2/3	△	‖	|||	|||	||▮	"	7/8	

Numeric Character Location Listing

The complete character library is listed below, arranged in numeric order by hexadecimal address. Included is the decimal address and the symbol's technical name.

Hex Value	Decimal Value	Symbol Name
0000	0000	Overline
0001	0001	Uppercase I with umlaut
0002	0002	Lowercase Thorn
0003	0003	Black Heart
0004	0004	Black Diamond
0005	0005	Black Club
0006	0006	Black Spade
0007	0007	Umlaut
0008	0008	*(used in other Printronix printer models)*
0009	0009	Uppercase Eth
000A	0010	Uppercase A with Acute Accent Mark
000B	0011	Uppercase I with Acute Accent Mark
000C	0012	Uppercase O with Acute Accent Mark
000D	0013	Uppercase U with Acute Accent Mark
000E	0014	Lowercase Y with Acute Accent Mark
000F	0015	Uppercase Y with Acute Accent Mark
0010	0016	Uppercase O with Slash
0011	0017	Uppercase A with Grave Accent Mark
0012	0018	Uppercase E with Grave Accent Mark
0013	0019	Uppercase I with Grave Accent Mark
0014	0020	Paragraph Sign
0015	0021	Section Sign
0016	0022	Uppercase O with Grave Accent Mark
0017	0023	Uppercase U with Grave Accent Mark
0018	0024	International Currency Symbol
0019	0025	Uppercase Thorn
001A	0026	Lowercase Eth
001B	0027	Solid Vertical Bar
001C	0028	Cedilla
001D	0029	Double Underline
001E	0030	Multiplication Sign
001F	0031	Lowercase O with Slash
0020	0032	Space
0021	0033	Exclamation Mark
0022	0034	Double Quote
0023	0035	Number Sign
0024	0036	Dollar Sign
0025	0037	Percent Sign

(continued)

Hex Value	Decimal Value	Symbol Name
0026	0038	Ampersand
0027	0039	Single Quote
0028	0040	Left Parenthesis
0029	0041	Right Parenthesis
002A	0042	Asterisk
002B	0043	Plus Sign
002C	0044	Comma
002D	0045	Minus Sign
002E	0046	Period
002F	0047	Slash
0030	0048	Zero
0031	0049	One
0032	0050	Two
0033	0051	Three
0034	0052	Four
0035	0053	Five
0036	0054	Six
0037	0055	Seven
0038	0056	Eight
0039	0057	Nine
003A	0058	Colon
003B	0059	Semicolon
003C	0060	Less Than Symbol
003D	0061	Equals Sign
003E	0062	Greater Than Symbol
003F	0063	Question Mark
0040	0064	At Sign
0041	0065	Uppercase A/Alpha
0042	0066	Uppercase B/Beta
0043	0067	Uppercase C
0044	0068	Uppercase D
0045	0069	Uppercase E/Epsilon
0046	0070	Uppercase F
0047	0071	Uppercase G
0048	0072	Uppercase H/Eta
0049	0073	Uppercase I/Iota
004A	0074	Uppercase J
004B	0075	Uppercase K/Kappa
004C	0076	Uppercase L
004D	0077	Uppercase M/Mu
004E	0078	Uppercase N/Nu
004F	0079	Uppercase O/Omicron
0050	0080	Uppercase P/Rho
0051	0081	Uppercase Q

(continued)

Hex Value	Decimal Value	Symbol Name
0052	0082	Uppercase R
0053	0083	Uppercase S
0054	0084	Uppercase T
0055	0085	Uppercase U
0056	0086	Uppercase V
0057	0087	Uppercase W
0058	0088	Uppercase X/Chi
0059	0089	Uppercase Y/Upsilon
005A	0090	Uppercase Z/Zeta
005B	0091	Left Bracket
005C	0092	Back Slash
005D	0093	Right Bracket
005E	0094	Circumflex
005F	0095	Underline
0060	0096	Grave Accent Mark
0061	0097	Lowercase A
0062	0098	Lowercase B
0063	0099	Lowercase C
0064	0100	Lowercase D
0065	0101	Lowercase E
0066	0102	Lowercase F
0067	0103	Lowercase G
0068	0104	Lowercase H
0069	0105	Lowercase I
006A	0106	Lowercase J
006B	0107	Lowercase K
006C	0108	Lowercase L
006D	0109	Lowercase M
006E	0110	Lowercase N
006F	0111	Lowercase O/Omicron
0070	0112	Lowercase P
0071	0113	Lowercase Q
0072	0114	Lowercase R
0073	0115	Lowercase S
0074	0116	Lowercase T
0075	0117	Lowercase U
0076	0118	Lowercase V
0077	0119	Lowercase W
0078	0120	Lowercase X
0079	0121	Lowercase Y
007A	0122	Lowercase Z
007B	0123	Left Brace
007C	0124	Broken Vertical Bar
007D	0125	Right Brace

(continued)

Hex Value	Decimal Value	Symbol Name
007E	0126	Tilde
007F	0127	Caron
0080	0128	Uppercase C with Cedilla
0081	0129	Lowercase U with Umlaut
0082	0130	Lowercase E with Acute Accent Mark
0083	0131	Lowercase A with Circumflex
0084	0132	Lowercase A with Umlaut
0085	0133	Lowercase A with Grave Accent Mark
0086	0134	Lowercase A with Ring
0087	0135	Lowercase C with Cedilla
0088	0136	Lowercase E with Circumflex
0089	0137	Lowercase E with Umlaut
008A	0138	Lowercase E with Grave
008B	0139	Lowercase I with Umlaut
008C	0140	Lowercase I with Circumflex
008D	0141	Lowercase I with Grave Accent Mark
008E	0142	Uppercase A with Umlaut
008F	0143	Uppercase A with Ring
0090	0144	Uppercase E with Acute Accent Mark
0091	0145	Lowercase AE with Ligature
0092	0146	Uppercase AE with Ligature
0093	0147	Lowercase O with Circumflex
0094	0148	Lowercase O with Umlaut
0095	0149	Lowercase O with Grave Accent Mark
0096	0150	Lowercase U with Circumflex
0097	0151	Lowercase U with Grave
0098	0152	Lowercase Y with Umlaut
0099	0153	Uppercase O with Umlaut
009A	0154	Uppercase U with Umlaut
009B	0155	Cent Sign
009C	0156	Pound Sign
009D	0157	Yen Sign
009E	0158	Peseta Sign
009F	0159	Franc Sign
00A0	0160	Lowercase A with Acute Accent Mark
00A1	0161	Lowercase I with Acute Accent Mark
00A2	0162	Lowercase O with Acute Accent Mark
00A3	0163	Lowercase U with Acute Accent Mark
00A4	0164	Lowercase N with Tilde
00A5	0165	Uppercase N with Tilde
00A6	0166	Feminine Ordinal Indicator
00A7	0167	Masculine Ordinal Indicator
00A8	0168	Inverted Question Mark
00A9	0169	Backward Not Sign

(continued)

Hex Value	Decimal Value	Symbol Name
00AA	0170	Not Sign
00AB	0171	Fraction One Half
00AC	0172	Fraction One Quarter
00AD	0173	Inverted Exclamation Mark
00AE	0174	Left Angle Quote
00AF	0175	Right Angle Quote
00B0	0176	Gray, 25% density
00B1	0177	Gray, 50% density
00B2	0178	Gray, 75% density
00B3	0179	Graphics Bar Top to Bottom
00B4	0180	Graphics Bar Left to Center Top to Bottom
00B5	0181	Graphics Bar Double Left to Center Top to Bottom
00B6	0182	Graphics Bar Left to Center Double Top to Bottom
00B7	0183	Graphics Bar Left to Center Double Center to Bottom
00B8	0184	Graphics Bar Double Left to Center Center to Bottom
00B9	0185	Graphics Bar Double Left to Center Double Top to Bottom
00BA	0186	Graphics Bar Double Top to Bottom
00BB	0187	Graphics Bar Double Left to Center Double Center to Bottom
00BC	0188	Graphics Bar Double Left to Center Double Top to Center
00BD	0189	Graphics Bar Left to Center Double Top to Center
00BE	0190	Graphics Bar Double Left to Center Top to Center
00BF	0191	Graphics Bar Left to Center Center to Bottom
00C0	0192	Graphics Bar Right to Center Top to Center
00C1	0193	Graphics Bar Left to Right Top to Center
00C2	0194	Graphics Bar Left to Right Center to Bottom
00C3	0195	Graphics Bar Right to Center Top to Bottom
00C4	0196	Graphics Bar Left to Right
00C5	0197	Graphics Bar Left to Right Top to Bottom
00C6	0198	Graphics Bar Double Right to Center Top to Bottom
00C7	0199	Graphics Bar Right to Center Double Top to Bottom
00C8	0200	Graphics Bar Double Right to Center Double Top to Bottom
00C9	0201	Graphics Bar Double Right to Center Double Center to Bottom
00CA	0202	Graphics Bar Double Left to Right Double Top to Center
00CB	0203	Graphics Bar Double Left to Right Double Center to Bottom
00CC	0204	Graphics Bar Double Right to Center Double Top to Bottom
00CD	0205	Graphics Bar Double Left to Right

(continued)

Hex Value	Decimal Value	Symbol Name
00CE	0206	Graphics Bar Double Left to Right Double Top to Bottom
00CF	0207	Graphics Bar Double Left to Right Top to Center
00D0	0208	Graphics Bar Left to Right Double Top to Center
00D1	0209	Graphics Bar Double Left to Right Center to Bottom
00D2	0210	Graphics Bar Left to Right Double Center to Bottom
00D3	0211	Graphics Bar Right to Center Double Top to Center
00D4	0212	Graphics Bar Double Right to Center Top to Center
00D5	0213	Graphics Bar Double Right to Center Center to Bottom
00D6	0214	Graphics Bar Right to Center Double Center to Bottom
00D7	0215	Graphics Bar Left to Right Double Top to Bottom
00D8	0216	Graphics Bar Double Left to Right Top to Bottom
00D9	0217	Graphics Bar Left to Center Top to Center
00DA	0218	Graphics Bar Right to Center Center to Bottom
00DB	0219	Graphics Block Black
00DC	0220	Graphics Block Black Bottom Half
00DD	0221	Graphics Block Black Left Half
00DE	0222	Graphics Block Black Right Half
00DF	0223	Graphics Block Black Top Half
00E0	0224	Lowercase Alpha
00E1	0225	Lowercase Beta
00E2	0226	Uppercase Gamma
00E3	0227	Lowercase Pi
00E4	0228	Uppercase Sigma
00E5	0229	Lowercase Sigma
00E6	0230	Lowercase Mu
00E7	0231	Lowercase Tau
00E8	0232	Uppercase Phi
00E9	0233	Uppercase Theta
00EA	0234	Uppercase Omega
00EB	0235	Lowercase Delta
00EC	0236	Infinity
00ED	0237	Lowercase Phi Script
00EE	0238	Lowercase Epsilon (Ancient)
00EF	0239	Intersection Symbol
00F0	0240	Equivalent Symbol
00F1	0241	Plus or Minus Symbol
00F2	0242	Greater Than or Equal Symbol
00F3	0243	Less Than or Equal Symbol
00F4	0244	Integral Symbol Top Half
00F5	0245	Integral Symbol Bottom Half
00F6	0246	Divide Symbol
00F7	0247	Approximate Sign
00F8	0248	Degree Symbol

(continued)

Hex Value	Decimal Value	Symbol Name
00F9	0249	Big Dot
00FA	0250	Small Dot
00FB	0251	Radical Symbol
00FC	0252	Superscript Lowercase N
00FD	0253	Superscript 2
00FE	0254	Small Square
00FF	0255	Semicolon with Overline
0100	0256	Uppercase A with Circumflex
0101	0257	Uppercase E with Circumflex
0102	0258	Uppercase I with Circumflex
0103	0259	Uppercase O with Circumflex
0104	0260	Uppercase U with Circumflex
0105	0261	Lowercase A with Tilde
0106	0262	Lowercase O with Tilde
0107	0263	Uppercase A with Tilde
0108	0264	Uppercase O with Tilde
0109	0265	Fraction Three Quarters
010A	0266	Superscript 1
010B	0267	Superscript 3
010C	0268	Acute Accent Mark
010D	0269	Uppercase E with Umlaut
010E	0270	Copyright Symbol
010F	0271	Reserved Symbol
0110	0272	Uppercase IJ with Ligature
0111	0273	Lowercase IJ with Ligature
0112	0274	Uppercase Elif
0113	0275	Lowercase Elif
0114	0276	Uppercase G with Caron
0115	0277	Lowercase G with Caron
0116	0278	Uppercase S with Cedilla
0117	0279	Lowercase S with Cedilla
0118	0280	Uppercase I with Ring
0119	0281	Uppercase Alpha with Rough
011A	0282	Uppercase Epsilon with Rough
011B	0283	Uppercase Eta with Rough
011C	0284	Uppercase Iota with Rough
011D	0285	Uppercase I with Bar
011E	0286	Uppercase I Prime with Bar
011F	0287	Uppercase O Prime
0120	0288	Uppercase T Prime
0121	0289	Uppercase T with Bar
0122	0290	Uppercase T with Prime Bar
0123	0291	Uppercase Omega with Rough
0124	0292	Lowercase Alpha with Rough

(continued)

Hex Value	Decimal Value	Symbol Name
0125	0293	Lowercase Epsilon with Rough
0126	0294	Lowercase Eta with Rough
0127	0295	Lowercase Iota with Rough
0128	0296	Lowercase Iota with Umlaut
0129	0297	Lowercase Iota with Circumflex
012A	0298	Lowercase Omicron with Rough
012B	0299	Lowercase Upsilon with Rough
012C	0300	Lowercase Upsilon with Umlaut
012D	0301	Lowercase Upsilon with Umlaut and Rough
012E	0302	Lowercase Omega with Rough
012F	0303	Uppercase Delta
0130	0304	Uppercase Lambda
0131	0305	Uppercase Xi
0132	0306	Uppercase Pi
0133	0307	Uppercase Tau
0134	0308	Uppercase Psi
0135	0309	Lowercase Gamma
0136	0310	Lowercase Epsilon (Modern)
0137	0311	Lowercase Zeta
0138	0312	Lowercase Eta
0139	0313	Lowercase Theta
013A	0314	Lowercase Iota
013B	0315	Lowercase Kappa
013C	0316	Lowercase Lambda
013D	0317	Lowercase Nu
013E	0318	Lowercase Xi
013F	0319	Lowercase Rho
0140	0320	Lowercase Sigma Script
0141	0321	Fraction One Eleventh
0142	0322	Lowercase Upsilon
0143	0323	Lowercase Phi
0144	0324	Lowercase Chi
0145	0325	Lowercase Psi
0146	0326	Lowercase Omega
0147	0327	AND Symbol
0148	0328	OR Symbol
0149	0329	Right Subset Symbol
014A	0330	Left Subset Symbol
014B	0331	Left Implies Symbol
014C	0332	Right Implies Symbol
014D	0333	Therefore Symbol
014E	0334	Since Symbol
014F	0335	Such That Symbol
0150	0336	Right Improper Subset Symbol

(continued)

Hex Value	Decimal Value	Symbol Name
0151	0337	Left Improper Subset Symbol
0152	0338	Bi−Implicative Symbol
0153	0339	For All Symbol
0154	0340	For Some Symbol
0155	0341	Uppercase Epsilon in Script
0156	0342	Uppercase Zeta in Script
0157	0343	Uppercase Xi in Script
0158	0344	Uppercase Lambda in Script
0159	0345	Integral Symbol
015A	0346	Length Integral Symbol
015B	0347	Lowercase Backward Delta
015C	0348	Congruent Symbol
015D	0349	Approximate or Equivalent Symbol
015E	0350	Not Equal Symbol
015F	0351	Lowercase F in Script
0160	0352	Proportionate Symbol
0161	0353	Parallel Symbol
0162	0354	Perpendicular Symbol
0163	0355	Jupiter Symbol
0164	0356	Double Acute Accent Mark
0165	0357	Minus or Plus Symbol
0166	0358	Dash 1 em
0167	0359	Dash 2 em
0168	0360	Dash 3 em
0169	0361	Dash 4 em
016A	0362	Dagger
016B	0363	Double Dagger
016C	0364	Cross
016D	0365	Ellipsis
016E	0366	Fraction One Third
016F	0367	Fraction Two Thirds
0170	0368	Fraction One Fifth
0171	0369	Fraction Two Fifths
0172	0370	Fraction Three Fifths
0173	0371	Fraction Four Fifths
0174	0372	Check Mark
0175	0373	Male Symbol
0176	0374	Female Symbol
0177	0375	Blank Symbol
0178	0376	Double Comma
0179	0377	Per Symbol
017A	0378	White Diamond
017B	0379	White Heart
017C	0380	Gemini Symbol

(continued)

Hex Value	Decimal Value	Symbol Name
017D	0381	White Hex Symbol
017E	0382	White Square Symbol
017F	0383	Triangle Symbol
0180	0384	Point to Bottom Symbol
0181	0385	Point to Right Symbol
0182	0386	Point to Left Symbol
0183	0387	White Rectangle Symbol
0184	0388	Fixed Star Symbol
0185	0389	Hemisphere Symbol
0186	0390	Junction Symbol
0187	0391	Point to Bottom Left (or Right Angle) Symbol
0188	0392	Point to Bottom Right Symbol
0189	0393	Point to Top Left Symbol
018A	0394	Point to Top Right Symbol
018B	0395	Bar Code 1
018C	0396	Bar Code 2
018D	0397	Bar Code 3
018E	0398	Bar Code 4
018F	0399	Bar Code 5
0190	0400	Bar Code 6
0191	0401	Bar Code 7
0192	0402	Bar Code 8
0193	0403	Bar Code 9
0194	0404	Bar Code A
0195	0405	Bar Code B
0196	0406	Bar Code C
0197	0407	Bar Code D
0198	0408	Bar Code E
0199	0409	Bar Code F
019A	0410	Bar Code 10
019B	0411	Bar Code 11
019C	0412	Bar Code 12
019D	0413	Bar Code 13
019E	0414	Bar Code 14
019F	0415	Bar Code 15
01A0	0416	Bar Code 16
01A1	0417	Bar Code 17
01A2	0418	Bar Code 18
01A3	0419	Bar Code 19
01A4	0420	Bar Code 1A
01A5	0421	Bar Code 1B
01A6	0422	Bar Code 1C
01A7	0423	Bar Code 1D
01A8	0424	Bar Code 1E

(continued)

Hex Value	Decimal Value	Symbol Name
01A9	0425	Bar Code 1F
01AA	0426	Bar Code 20
01AB	0427	Bar Code 21
01AC	0428	Bar Code 22
01AD	0429	Bar Code 23
01AE	0430	Bar Code 24
01AF	0431	Bar Code 25
01B0	0432	Bar Code 26
01B1	0433	Bar Code 27
01B2	0434	Bar Code 28
01B3	0435	Bar Code 29
01B4	0436	Bar Code 2A
01B5	0437	Bar Code 2B
01B6	0438	Bar Code 2C
01B7	0439	Bar Code 2D
01B8	0440	Bar Code 2E
01B9	0441	Bar Code 2F
01BA	0442	Bar Code 30
01BB	0443	Bar Code 31
01BC	0444	Bar Code 2B
01BD	0445	Bar Code 2B
01BE	0446	Bar Code 2B
01BF	0447	Bar Code 35
01C0	0448	Bar Code 36
01C1	0449	Bar Code 37
01C2	0450	Bar Code 38
01C3	0451	Bar Code 39
01C4	0452	Bar Code 3A
01C5	0453	Bar Code 3B
01C6	0454	Bar Code 3C
01C7	0455	Bar Code 3D
01C8	0456	Bar Code 3E
01C9	0457	Bar Code 3F
01CA	0458	Bar Code 40
01CB	0459	Bar Code 41
01CC	0460	Bar Code 42
01CD	0461	Bar Code 43
01CE	0462	Bar Code 44
01CF	0463	Bar Code 45
01D0	0464	Bar Code 46
01D1	0465	Bar Code 47
01D2	0466	Bar Code 48
01D3	0467	Bar Code 49
01D4	0468	Uppercase OE Ligature

(continued)

Hex Value	Decimal Value	Symbol Name
01D5	0469	Lowercase OE Ligature
01D6	0470	Asterisk with Overline
01D7	0471	Black Out Box
01D8	0472	Uppercase Y with Umlaut
01D9	0473	Lowercase E with Tilde
01DA	0474	Lowercase I with Tilde
01DB	0475	Lowercase U with Tilde
01DC	0476	Fraction one Eighth
01DD	0477	Fraction Three Eighths
01DE	0478	Fraction Five Eighths
01DF	0479	Fraction Seven Eighths
01E0	0480	*(used in other Printronix printer models)*
01E1	0481	Double Over Line
01E2	0482	Rough Accent Mark (Greek)
01E3	0483	Fork
01E4	0484	Chair
01E5	0485	Hook
01E6	0486	Uppercase Underline
01E7	0487	Uppercase I Centered
01E8	0488	Uppercase I Right
01E9	0489	Uppercase I Right Underlined
01EA	0490	Lowercase O with Dot
01EB	0491	Up Arrow
01EC	0492	Down Arrow
01ED	0493	Right Arrow

Alphabetical Character Location Listing

The complete character library is listed below, arranged in alphabetical order by the symbol's technical name. Included are the hexadecimal and decimal values for each symbol.

Hex Value	Decimal Value	Symbol Name
010C	0268	Acute Accent
0026	0038	Ampersand
0147	0327	AND Symbol
015D	0349	Approximate or Equivalent Symbol
00F7	0247	Approximate Sign
002A	0042	Asterisk
01D6	0470	Asterisk with Overline
0040	0064	At
005C	0092	Back Slash
00A9	0169	Backward Not
018B	0395	Bar Code 1
018C	0396	Bar Code 2
018D	0397	Bar Code 3
018E	0398	Bar Code 4
018F	0399	Bar Code 5
0190	0400	Bar Code 6
0191	0401	Bar Code 7
0192	0402	Bar Code 8
0193	0403	Bar Code 9
0194	0404	Bar Code A
0195	0405	Bar Code B
0196	0406	Bar Code C
0197	0407	Bar Code D
0198	0408	Bar Code E
0199	0409	Bar Code F
019A	0410	Bar Code 10
019B	0411	Bar Code 11
019C	0412	Bar Code 12
019D	0413	Bar Code 13
019E	0414	Bar Code 14
019F	0415	Bar Code 15
01A0	0416	Bar Code 16
01A1	0417	Bar Code 17
01A2	0418	Bar Code 18
01A3	0419	Bar Code 19
01A4	0420	Bar Code 1A
01A5	0421	Bar Code 1B
01A6	0422	Bar Code 1C

(continued)

Hex Value	Decimal Value	Symbol Name
01A7	0423	Bar Code 1D
01A8	0424	Bar Code 1E
01A9	0425	Bar Code 1F
01AA	0426	Bar Code 20
01AB	0427	Bar Code 21
01AC	0428	Bar Code 22
01AD	0429	Bar Code 23
01AE	0430	Bar Code 24
01AF	0431	Bar Code 25
01B0	0432	Bar Code 26
01B1	0433	Bar Code 27
01B2	0434	Bar Code 28
01B3	0435	Bar Code 29
01B4	0436	Bar Code 2A
01B5	0437	Bar Code 2B
01B6	0438	Bar Code 2C
01B7	0439	Bar Code 2D
01B8	0440	Bar Code 2E
01B9	0441	Bar Code 2F
01BA	0442	Bar Code 30
01BB	0443	Bar Code 31
01BC	0444	Bar Code 32
01BD	0445	Bar Code 33
01BE	0446	Bar Code 34
01BF	0447	Bar Code 35
01C0	0448	Bar Code 36
01C1	0449	Bar Code 37
01C2	0450	Bar Code 38
01C3	0451	Bar Code 39
01C4	0452	Bar Code 3A
01C5	0453	Bar Code 3B
01C6	0454	Bar Code 3C
01C7	0455	Bar Code 3D
01C8	0456	Bar Code 3E
01C9	0457	Bar Code 3F
01CA	0458	Bar Code 40
01CB	0459	Bar Code 41
01CC	0460	Bar Code 42
01CD	0461	Bar Code 43
01CE	0462	Bar Code 44
01CF	0463	Bar Code 45
01D0	0464	Bar Code 46
01D1	0465	Bar Code 47
01D2	0466	Bar Code 48

(continued)

Hex Value	Decimal Value	Symbol Name
01D3	0467	Bar Code 49
00F9	0249	Big Dot
0152	0338	Bi−Implicative Symbol
0005	0005	Black Club
0004	0004	Black Diamond
0003	0003	Black Heart
01D7	0471	Black Out Box
0006	0006	Black Spade
0177	0375	Blank Symbol
007C	0124	Broken Vertical Bar
007F	0127	Caron
001C	0028	Cedilla
009B	0155	Cent Sign
01E4	0484	Chair
0174	0372	Check Mark
005E	0094	Circumflex
003A	0058	Colon
002C	0044	Comma
015C	0348	Congruent Symbol
010E	0270	Copyright Symbol
016C	0364	Cross
016A	0362	Dagger
0166	0358	Dash 1 em
0167	0359	Dash 2 em
0168	0360	Dash 3 em
0169	0361	Dash 4 em
00F8	0248	Degree Symbol
00F6	0246	Divide Symbol
0024	0036	Dollar Sign
0164	0356	Double Acute Accent Mark
0178	0376	Double Comma
016B	0363	Double Dagger
01E1	0481	Double Over Line
0022	0034	Double Quote
001D	0029	Double Underline
01EC	0492	Down Arrow
0038	0056	Eight
016D	0365	Ellipsis
003D	0061	Equals Sign
00F0	0240	Equivalent Symbol
0021	0033	Exclamation Mark
0176	0374	Female Symbol
00A6	0166	Feminine Ordinal Indicator
0035	0053	Five

(continued)

Hex Value	Decimal Value	Symbol Name
0184	0388	Fixed Star Symbol
0153	0339	For All Symbol
0154	0340	For Some Symbol
01E3	0483	Fork
0034	0052	Four
0173	0371	Fraction Four Fifths
01DC	0476	Fraction One Eighth
0141	0321	Fraction One Eleventh
0170	0368	Fraction One Fifth
00AB	0171	Fraction One Half
00AC	0172	Fraction One Quarter
016E	0366	Fraction One Third
01DE	0478	Fraction Five Eighths
01DF	0479	Fraction Seven Eighths
01DD	0477	Fraction Three Eighths
0172	0370	Fraction Three Fifths
0109	0265	Fraction Three Quarters
0171	0369	Fraction Two Fifths
016F	0367	Fraction Two Thirds
009F	0159	Franc Sign
017C	0380	Gemini Symbol
00B8	0184	Graphics Bar Double Left to Center Center to Bottom
00BB	0187	Graphics Bar Double Left to Center Double Center to Bottom
00B9	0185	Graphics Bar Double Left to Center Double Top to Bottom
00BC	0188	Graphics Bar Double Left to Center Double Top to Center
00B5	0181	Graphics Bar Double Left to Center Top to Bottom
00BE	0190	Graphics Bar Double Left to Center Top to Center
00CD	0205	Graphics Bar Double Left to Right
00D1	0209	Graphics Bar Double Left to Right Center to Bottom
00CB	0203	Graphics Bar Double Left to Right Double Center to Bottom
00CE	0206	Graphics Bar Double Left to Right Double Top to Bottom
00CA	0202	Graphics Bar Double Left to Right Double Top to Center
00D8	0216	Graphics Bar Double Left to Right Top to Bottom
00CF	0207	Graphics Bar Double Left to Right Top to Center
00D5	0213	Graphics Bar Double Right to Center Center to Bottom
00C9	0201	Graphics Bar Double Right to Center Double Center to Bottom

(continued)

Hex Value	Decimal Value	Symbol Name
00CC	0204	Graphics Bar Double Right to Center Double Top to Bottom
00C8	0200	Graphics Bar Double Right to Center Double Top to Center
00C6	0198	Graphics Bar Double Right to Center Top to Bottom
00D4	0212	Graphics Bar Double Right to Center Top to Center
00BA	0186	Graphics Bar Double Top to Bottom
00B7	0183	Graphics Bar Left to Center Double Center to Bottom
00B6	0182	Graphics Bar Left to Center Double Top to Bottom
00BD	0189	Graphics Bar Left to Center Double Top to Center
00BF	0191	Graphics Bar Left to Center Center to Bottom
00B4	0180	Graphics Bar Left to Center Top to Bottom
00D9	0217	Graphics Bar Left to Center Top to Center
00C4	0196	Graphics Bar Left to Right
00C2	0194	Graphics Bar Left to Right Center to Bottom
00D2	0210	Graphics Bar Left to Right Double Center to Bottom
00D7	0215	Graphics Bar Left to Right Double Top to Bottom
00D0	0208	Graphics Bar Left to Right Double Top to Center
00C5	0197	Graphics Bar Left to Right Top to Bottom
00C1	0193	Graphics Bar Left tot Right Top to Center
00DA	0218	Graphics Bar Right to Center Center to Bottom
00D6	0214	Graphics Bar Right to Center Double Center to Bottom
00C7	0199	Graphics Bar Right to Center Double Top to Bottom
00D3	0211	Graphics Bar Right to Center Double Top to Center
00C3	0195	Graphics Bar Right to Center Top to Bottom
00C0	0192	Graphics Bar Right to Center Top to Center
00B3	0179	Graphics Bar Top to Bottom
00DB	0219	Graphics Block Black
00DC	0220	Graphics Block Black Bottom Half
00DD	0221	Graphics Block Black Left Half
00DE	0222	Graphics Block Black Right Half
00DF	0223	Graphics Block Black Top Half
0060	0096	Grave Accent Mark
00B0	0179	Gray, 25% density
00B1	0177	Gray, 50% density
00B2	0178	Gray, 75% density
00F2	0242	Greater Than or Equal Symbol
003E	0062	Greater Than Symbol
0185	0389	Hemisphere Symbol
01E5	0485	Hook
00EC	0236	Infinity
0159	0345	Integral Symbol
00F4	0244	Integral Symbol Top Half
00F5	0245	Integral Symbol Bottom Half

(continued)

Hex Value	Decimal Value	Symbol Name
0018	0024	International Currency Symbol
00EF	0239	Intersection Symbol
00AD	0173	Inverted Exclamation Mark
00A8	0168	Inverted Question Mark
0186	0390	Junction Symbol
0163	0355	Jupiter Symbol
00AE	0174	Left Angle Quote
007B	0123	Left Brace
005B	0091	Left Bracket
014B	0331	Left Implies Symbol
0151	0337	Left Improper Subset
0028	0040	Left Parenthesis
014A	0330	Left Subset Symbol
015A	0346	Length Integral Symbol
00F3	0243	Less Than or Equal Symbol
003C	0060	Less Than Symbol
0061	0097	Lowercase A
00A0	0160	Lowercase A with Acute Accent Mark
0083	0131	Lowercase A with Circumflex
0085	0133	Lowercase A with Grave Accent Mark
0086	0134	Lowercase A with Ring
0105	0261	Lowercase A with Tilde
0084	0132	Lowercase A with Umlaut
0091	0145	Lowercase AE with Ligature
00E0	0224	Lowercase Alpha
0124	0292	Lowercase Alpha with Rough
0062	0098	Lowercase B
015B	0347	Lowercase Backward Delta
00E1	0225	Lowercase Beta
0063	0099	Lowercase C
0087	0135	Lowercase C with Cedilla
0144	0324	Lowercase Chi
0064	0100	Lowercase D
00EB	0235	Lowercase Delta
0065	0101	Lowercase E
0082	0130	Lowercase E with Acute Accent Mark
0088	0136	Lowercase E with Circumflex
008A	0138	Lowercase E with Grave
01D9	0473	Lowercase E with Tilde
0089	0137	Lowercase E with Umlaut
0113	0275	Lowercase Elif
00EE	0238	Lowercase Epsilon (Ancient)
0136	0310	Lowercase Epsilon (Modern)
0125	0293	Lowercase Epsilon with Rough

(continued)

Hex Value	Decimal Value	Symbol Name
0138	0312	Lowercase Eta
0126	0294	Lowercase Eta with Rough
001A	0026	Lowercase Eth
0066	0102	Lowercase F
015F	0351	Lowercase F in Script
0067	0103	Lowercase G
0115	0277	Lowercase G with Caron
0135	0309	Lowercase Gamma
0068	0104	Lowercase H
0069	0105	Lowercase I
00A1	0161	Lowercase I with Acute Accent Mark
008C	0140	Lowercase I with Circumflex
008D	0141	Lowercase I with Grave Accent Mark
01DA	0474	Lowercase I with Tilde
008B	0139	Lowercase I with Umlaut
0111	0273	Lowercase IJ with Ligature
013A	0314	Lowercase Iota
0129	0297	Lowercase Iota with Circumflex
0127	0295	Lowercase Iota with Rough
0128	0296	Lowercase Iota with Umlaut
006A	0106	Lowercase J
006B	0107	Lowercase K
013B	0315	Lowercase Kappa
006C	0108	Lowercase L
013C	0316	Lowercase Lambda
006D	0109	Lowercase M
00E6	0230	Lowercase Mu
006E	0110	Lowercase N
00A4	0164	Lowercase N with Tilde
013D	0317	Lowercase Nu
006F	0111	Lowercase O/Omicron
00A2	0162	Lowercase O with Acute Accent Mark
0093	0147	Lowercase O with Circumflex
01EA	0490	Lowercase O with Dot
0095	0149	Lowercase O with Grave Accent Mark
0106	0262	Lowercase O with Tilde
0094	0148	Lowercase O with Umlaut
001F	0031	Lowercase O with Slash
01D5	0469	Lowercase OE Ligature
0146	0326	Lowercase Omega
012E	0302	Lowercase Omega with Rough
012A	0298	Lowercase Omicron with Rough
0070	0112	Lowercase P
0143	0323	Lowercase Phi

(continued)

Hex Value	Decimal Value	Symbol Name
00ED	0237	Lowercase Phi Script
00E3	0227	Lowercase Pi
0145	0325	Lowercase Psi
0071	0113	Lowercase Q
0072	0114	Lowercase R
013F	0319	Lowercase Rho
0073	0115	Lowercase S
0117	0279	Lowercase S with Cedilla
00E5	0229	Lowercase Sigma
0140	0320	Lowercase Sigma Script
0074	0116	Lowercase T
00E7	0231	Lowercase Tau
0139	0313	Lowercase Theta
0002	0002	Lowercase Thorn
0075	0117	Lowercase U
00A3	0163	Lowercase U with Acute Accent Mark
0096	0150	Lowercase U with Circumflex
0097	0151	Lowercase U with Grave
01DB	0475	Lowercase U with Tilde
0081	0129	Lowercase U with Umlaut
0142	0322	Lowercase Upsilon
012B	0299	Lowercase Upsilon with Rough
012C	0300	Lowercase Upsilon with Umlaut
012D	0301	Lowercase Upsilon with Umlaut and Rough
0076	0118	Lowercase V
0077	0119	Lowercase W
0078	0120	Lowercase X
013E	0318	Lowercase Xi
0079	0121	Lowercase Y
000E	0014	Lowercase Y with Acute Accent Mark
0098	0152	Lowercase Y with Umlaut
007A	0122	Lowercase Z
0137	0311	Lowercase Zeta
0175	0373	Male Symbol
00A7	0167	Masculine Ordinal Indicator
002D	0045	Minus Sign
0165	0357	Minus or Plus Symbol
001E	0030	Multiplication Sign
0039	0057	Nine
015E	0350	Not Equal
00AA	0170	Not Sign
0023	0035	Number Sign
0031	0049	One
0148	0328	OR Symbol

(continued)

Hex Value	Decimal Value	Symbol Name
0000	0000	Overline
0014	0020	Paragraph Sign
0161	0353	Parallel Symbol
0179	0377	Per Symbol
0025	0037	Percent Sign
002E	0046	Period
0162	0354	Perpendicular Symbol
009E	0158	Peseta Sign
00F1	0241	Plus or Minus Symbol
002B	0043	Plus Sign
0180	0384	Point to Bottom Symbol
0187	0391	Point to Bottom Left (or Right Angle) Symbol
0188	0392	Point to Bottom Right Symbol
0182	0386	Point to Left Symbol
0181	0385	Point to Right Symbol
0189	0393	Point to Top Left Symbol
018A	0394	Point to Top Right Symbol
009C	0156	Pound Sign
0160	0352	Proportionate Symbol
003F	0063	Question Mark
00FB	0251	Radical Symbol
010F	0271	Reserved Symbol
00AF	0175	Right Angle Quote
01ED	0493	Right Arrow
007D	0125	Right Brace
005D	0093	Right Bracket
014C	0332	Right Implies Symbol
0150	0336	Right Improper Subset Symbol
0029	0041	Right Parenthesis
0149	0329	Right Subset Symbol
01E2	0482	Rough Accent Mark (Greek)
0015	0021	Section Sign
003B	0059	Semicolon
00FF	0255	Semicolon with Overline
0037	0055	Seven
014E	0334	Since Symbol
0027	0039	Single Quote
0036	0054	Six
002F	0047	Slash
00FA	0250	Small Dot
00FE	0254	Small Square
001B	0027	Solid Vertical Bar
0020	0032	Space
014F	0335	Such That Symbol

(continued)

Hex Value	Decimal Value	Symbol Name
00FC	0252	Superscript Lowercase N
010A	0266	Superscript 1
00FD	0253	Superscript 2
010B	0267	Superscript 3
014D	0333	Therefore Symbol
0033	0051	Three
007E	0126	Tilde
017F	0383	Triangle Symbol
0032	0050	Two
0007	0007	Umlaut
005F	0095	Underline
01EB	0491	Up Arrow
0041	0065	Uppercase A/Alpha
000A	0010	Uppercase A with Acute Accent Mark
0100	0256	Uppercase A with Circumflex
0011	0017	Uppercase A with Grave Accent Mark
008F	0143	Uppercase A with Ring
0107	0263	Uppercase A with Tilde
008E	0142	Uppercase A with Umlaut
0092	0146	Uppercase AE with Ligature
0119	0281	Uppercase Alpha with Rough
0042	0066	Uppercase B/Beta
0043	0067	Uppercase C
0080	0128	Uppercase C with Cedilla
0044	0068	Uppercase D
012F	0303	Uppercase Delta
0045	0069	Uppercase E/Epsilon
0090	0144	Uppercase E with Acute Accent Mark
0101	0257	Uppercase E with Circumflex
0012	0018	Uppercase E with Grave Accent Mark
010D	0269	Uppercase E with Umlaut
0112	0274	Uppercase Elif
0155	0341	Uppercase Epsilon in Script
011A	0282	Uppercase Epsilon with Rough
011B	0283	Uppercase Eta with Rough
0009	0009	Uppercase Eth
0046	0070	Uppercase F
0047	0071	Uppercase G
0114	0276	Uppercase G with Caron
00E2	0226	Uppercase Gamma
0048	0072	Uppercase H/Eta
0049	0073	Uppercase I/Iota
01E7	0487	Uppercase I Centered
01E8	0488	Uppercase I Right

(continued)

Hex Value	Decimal Value	Symbol Name
01E9	0489	Uppercase I Right Underline
011E	0286	Uppercase I Prime with Bar
000B	0011	Uppercase I with Acute Accent Mark
0102	0258	Uppercase I with Circumflex
011D	0285	Uppercase I with Bar
0013	0019	Uppercase I with Grave Accent Mark
0118	0280	Uppercase I with Ring
0001	0001	Uppercase I with Umlaut
0110	0272	Uppercase IJ with Ligature
011C	0284	Uppercase Iota with Rough
004A	0074	Uppercase J
004B	0075	Uppercase K/Kappa
004C	0076	Uppercase L
0130	0304	Uppercase Lambda
0158	0344	Uppercase Lambda in Script
004D	0077	Uppercase M/Mu
004E	0078	Uppercase N/Nu
00A5	0165	Uppercase N with Tilde
004F	0079	Uppercase O/Omicron
011F	0287	Uppercase O Prime
000C	0012	Uppercase O with Acute Accent Mark
0103	0259	Uppercase O with Circumflex
0016	0022	Uppercase O with Grave Accent Mark
0010	0016	Uppercase O with Slash
0108	0264	Uppercase O with Tilde
0099	0153	Uppercase O with Umlaut
01D4	0468	Uppercase OE Ligature
00EA	0234	Uppercase Omega
0123	0291	Uppercase Omega with Rough
0050	0080	Uppercase P/Rho
00E8	0232	Uppercase Phi
0132	0306	Uppercase Pi
0134	0308	Uppercase Psi
0051	0081	Uppercase Q
0052	0082	Uppercase R
0053	0083	Uppercase S
0116	0278	Uppercase S with Cedilla
00E4	0228	Uppercase Sigma
0054	0084	Uppercase T
0120	0288	Uppercase T Prime
0122	0290	Uppercase T Prime with Bar
0121	0289	Uppercase T with Bar
0133	0307	Uppercase Tau
00E9	0233	Uppercase Theta

(continued)

Hex Value	Decimal Value	Symbol Name
0019	0025	Uppercase Thorn
0055	0085	Uppercase U
000D	0013	Uppercase U with Acute Accent Mark
0104	0260	Uppercase U with Circumflex
0017	0023	Uppercase U with Grave Accent Mark
009A	0154	Uppercase U with Umlaut
01E6	0486	Uppercase Underline
0056	0086	Uppercase V
0057	0087	Uppercase W
0058	0088	Uppercase X/Chi
0131	0305	Uppercase Xi
0157	0343	Uppercase Xi in Script
0059	0089	Uppercase Y/Upsilon
000F	0015	Uppercase Y with Acute Accent Mark
01D8	0472	Uppercase Y with Umlaut
005A	0090	Uppercase Z/Zeta
0156	0342	Uppercase Zeta in Script
017A	0378	White Diamond
017B	0379	White Heart
017D	0381	White Hex Symbol
0183	0387	White Rectangle Symbol
017E	0382	White Square Symbol
009D	0157	Yen Sign
0030	0048	Zero

CHAPTER 11

INSTALLATION

Introduction

This chapter explains P9012 printer installation procedures. The following topics are covered:

- Power Requirements
- Site Requirements
- Shipping Restraints
- Paper Stacking Chain Assembly Installation
- Cable Connections
- Preliminary Test

Be sure to read this chapter carefully before installing and operating the printer. Perform the procedures in the order presented.

❑ CAUTION ❑

To avoid shipping damage, reinstall the shipping restraints whenever the printer is moved or shipped.

❑ VORSICHT ❑

Um Versandschäden zu verhindern, die Versand−Einspannungen wieder einbauen, wenn der Drucker versetzt oder versand wird.

Power Requirements

❑ CAUTION ❑

When the printer is powered−up, it draws 84 amperes, 1/2 cycle average. This is an important power consideration. It is recommended that printer power be supplied from a separate AC circuit protected at 20 amperes for 110 volts, or 10 amperes for 220 volts at 50 or 60 Hz, even though the printer will not rise in excess of 15 amperes at 110 volts.

❑ VORSICHT ❑

Wenn der Drucker angetrieben wird, benutzt er 84 Ampere mit einem Durchschnitt von 1/2 Zyklus. Dies ist ein wichtiger Stromhinweis. Es wird empfohlen, dass der Strom von einem separaten Wechselstromkreis dem Drucker zugeführt wird, der mit 20 Ampere für 110 Volt oder 10 Ampere für 220 Volt mit 50 oder 60 Hz geschützt ist, obwohl der Drucker nicht über 15 Ampere mit 110 Volt ansteigen wird.

A label on the back of the printer near the power cord indicates the voltage and frequency requirements. The printer must be connected to the specified power source, either 110, 220 or 240 volts at 50 to 60 Hz. Line voltage can vary ±±10%. The printer automatically senses and adjusts itself to conform to the proper voltage. Primary circuit protection is contained in the printer. Consult an electrician if printer operation affects local electrical lines.

❑ WARNING ❑

The power cord requires an I.E.C. (hot) connector to mate to the receptacle on the rear panel of the printer. The hot connector includes a polarizing key which prevents the use of cordsets that are not of the correct rating for the printer.

❑ WARNUNG ❑

Das Stromkabel benötigt einen I.E.C. (spannungsführenden) Stecker, der in die Steckdose an der hinteren Wand des Druckers passt. Der spannungsführende Stecker kommt mit einem Nulleiter, der die Benutzung von Stromkabeln ohne die korrekte Nennleistung für den Drucker verhindert.

Site Requirements

When selecting a printer location, consider interface requirements, power requirements, and environmental factors. Select a location that has the proper power source available and is within the maximum cable length specifications for interfacing with the host computer. The printer is designed to operate in a relatively dust free environment such as a computer room or business office with an ambient temperature of 5° to 40° C (41° to 104° F) and a relative humidity of 10% to 90%. The site selected for the printer must also allow air to circulate freely all around the printer. A minimum of 3 feet clearance behind the printer should be provided to allow air circulation and easy access to the paper stacking area. Figure 11−1 illustrates the site requirements.

❑ CAUTION ❑

The warranty may be voided if adequate printer ventilation is not provided. Overheating and serious damage to printer components can occur if the air vents at the sides and bottom of the printer are blocked.

❑ VORSICHT ❑

Die Gewährleistung könnte ungültig werden, wenn nicht genügen Druckerlüftung vorhanden ist. Überhitzung und schweren Schaden der Druckerkomponenten könnte vorkommen, wenn die Entlüftungsschlitze an den Seiten und unten am Drucker blockiert sind.

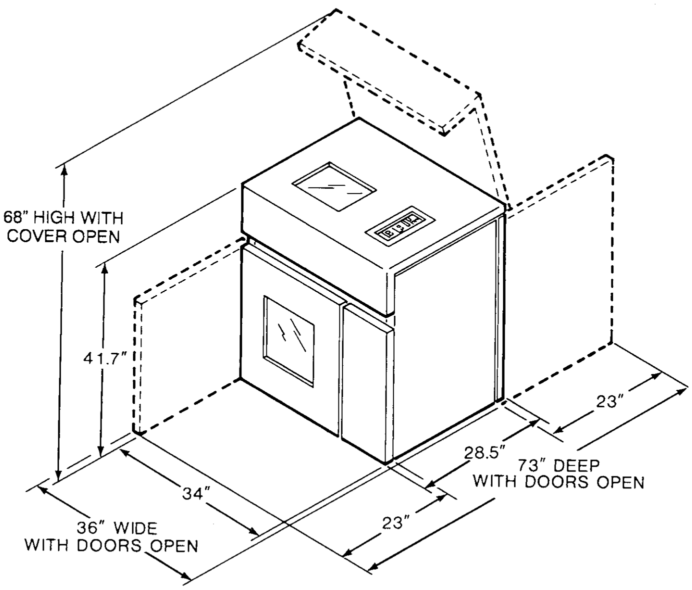


Figure 11−1. Site Requirements

Shipping Restraints

During shipping, the printer mechanism is protected by foam packing and removable tie wraps which secure the Forms Thickness Adjustment Lever, Paper Guide, Front Paper Fence, and Paper Tent. Remove the foam packing and tie wrap restraints as described below, referring to Figure 11−2.

❑ WARNING ❑

To prevent possible injury, do not connect the AC power source before removing the shipping restraints. If the power source has already been connected, disconnect it before performing the shipping restraint removal procedures.

❑ WARNUNG ❑

Um mögliche Verletzungen zu vermeiden, darf die Netzverbindung erst nach dem Entfernen der Transportbefestigungen hergestellt werden.

Shipping Restraint Removal

1. Swing open the left and right tractor gates (A) and remove the foam pad from the paper path in front of the platen.
2. Using the press−release tabs, remove the tie−wrap restraints:
   a. Securing the Forms Thickness Adjustment Lever (B).
   b. Securing the Paper Guide (C).
   c. Open the rear printer door and remove the tie−wraps securing the Front Paper Fence (D) to the cabinet frame.
   d. Securing the Paper Tent (E) to the Front Paper Fence (D).

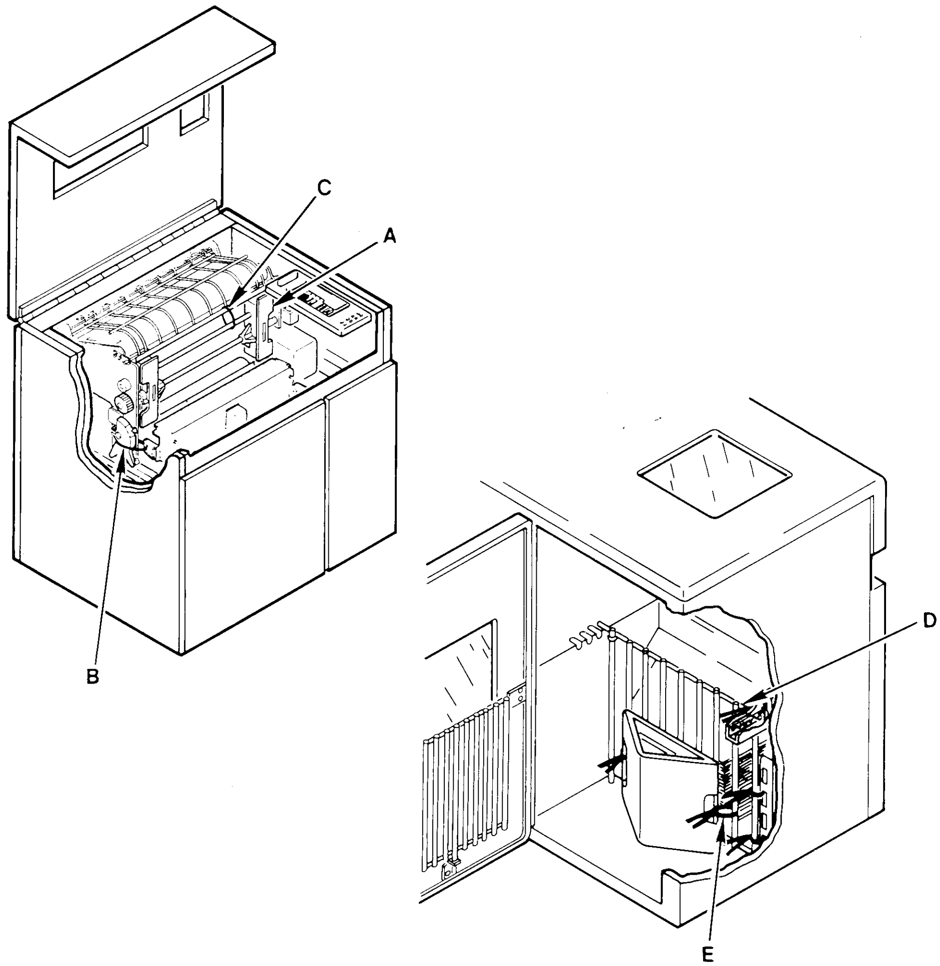


Figure 11−2. Shipping Restraint Removal

Paper Stacking Chain Assembly Installation

The Paper Stacking Chain Assembly is used on the printer to ensure correct paper flow and stacking. To install the Chain Assembly, perform the following steps and refer to Figure 11−3.

1. If paper is loaded in the printer, unload the paper (refer to the Operation chapter).
2. Open the printer rear door to access the paper stacking area.
3. Hook two long chains by their rings to the front of the wire paper guide (toward the front of the printer) and near each outer edge of the paper path. Hook the other two long chains to the rear of the wire paper guide and near each outer edge of the paper path for the paper width used.
4. Hook two of the short chains by their rings to the back of the paper guide and the other two short chains to the front of the paper guide, positioned near the center of the paper path.
5. Refer to the Paper Stacking instructions in the Operation chapter to start the paper stacking properly.

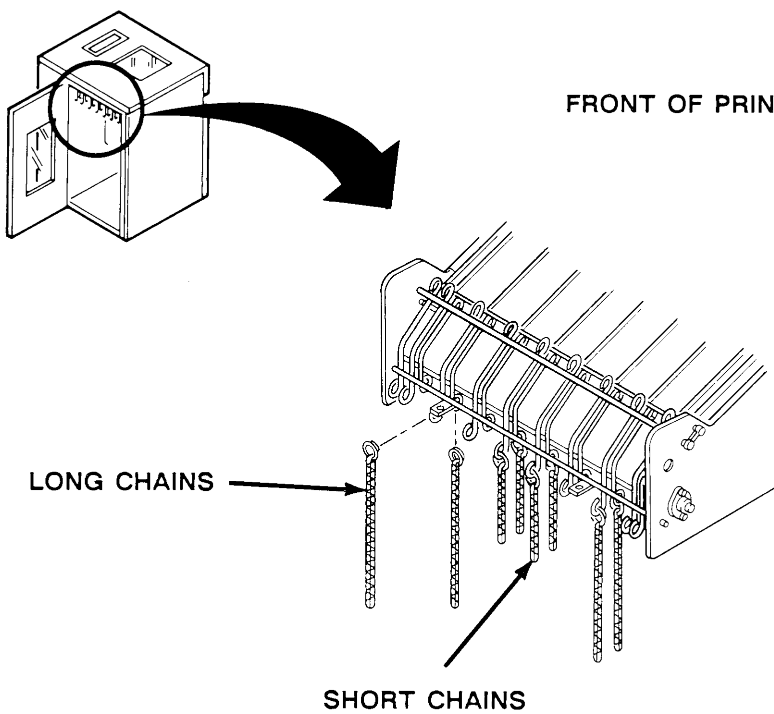


Figure 11−3. Chain Assembly Installation

Cable Connections

Perform the following steps and refer to Figure 11−4 to connect the cables to the printer.

1. Verify that the site line voltage is within the same range as that shown on the printer ID label (A) and that the proper power cord has been selected. (Refer to the Power Requirements section on page 11−1.)

2. Make sure the printer power switch (B) is set to OFF (0).

3. Connect the power cord to the printer's AC power connector (C) and the AC line receptacle.

4. Connect the interface cable (customer supplied) to the appropriate printer interface connector (D) and the host computer. Refer to the Interfaces chapter for a complete description of the printer interface.

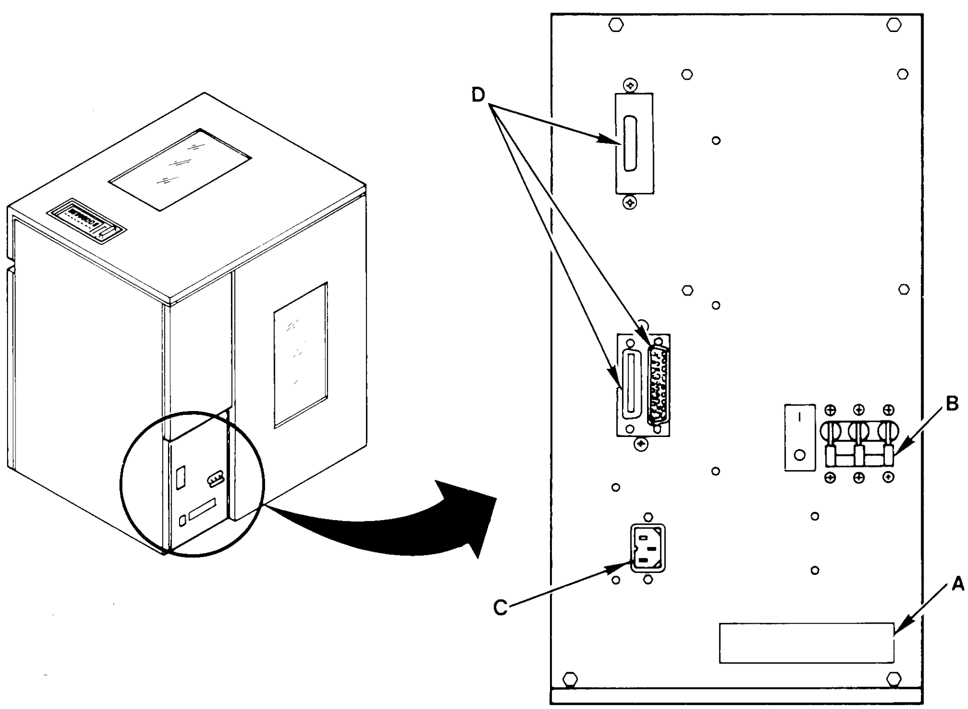


Figure 11−4. Cable Connections

Preliminary Test

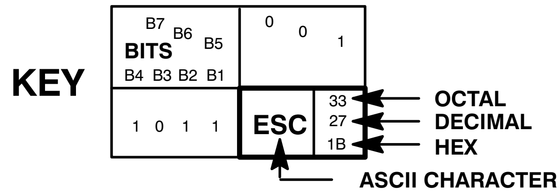
The printer is now ready for a preliminary test. The following steps define the test procedure. Control panel and Message Display features are explained in the Operation chapter.

1. Set the AC power switch to ON.
2. Load full–width (132 column) computer paper and ribbon (refer to the Operation chapter for Paper Loading instructions.)
3. Set top–of–form (refer to the Operation chapter).
4. Press the ON LINE switch until the display shows OFFLINE READY.
5. Press the MENU DOWN switch, then repeatedly press the NEXT switch until the DIAGNOSTICS menu appears on the display.
6. Press the MENU DOWN switch, then repeatedly press the NEXT switch until the PRINTER TEST FULL WIDTH menu appears on the display.
7. Press the MENU DOWN switch, then repeatedly press the NEXT switch until the PRINTER TEST SHIFT RECYCLE message appears on the display.
8. Press the RUN/STOP switch. The RUNNING TEST SHIFT RECYCLE message appears. Shifted lines of the character set will print across the full width of the paper (132 characters).
9. To stop the test, press the RUN/STOP switch.
10. Press CLEAR to return the printer to OFFLINE READY.

Examine the print quality. The characters should be correctly formed and of uniform density. If the test does not run or characters appear malformed, make sure the forms thickness lever is correctly adjusted for the paper thickness. Contact your authorized Service Representative for further assistance.

APPENDIX A

STANDARD ASCII CHARACTER CHART



BITS B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
B4 B3 B2 B1	ROW	COLUMN 0		1		2		3		4		5		6		7	
0 0 0 0	0	NUL	0 0 0	DLE	20 16 10	SP	40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1	SOH	1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2	STX	2 2 2	DC2	22 18 12	”	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3	ETX	3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4	EOT	4 4 4	DC4	24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	ENQ	5 5 5	NAK	25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6	ACK	6 6 6	SYN	26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7	ETB	27 23 17	’	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9	EM	31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 0 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 0 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 0 C	FS	34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	|	174 124 7C
1 1 0 1	13	CR	15 13 0 D	GS	35 29 1D	–	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 0 E	RS	36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 0 F	US	37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F	DEL	177 127 7F

APPENDIX B

CHARACTER SETS

Introduction

The character set charts in this Appendix provide the hexadecimal character address matrices for each character set and international language. For example, if the IBM PC Character Set and US ASCII Language is selected, 0023 hex selects the Number Sign (#). If IBM PC−English language is selected, hex 0023 on the IBM−PC International Language Substitution Table will substitute the English Pound symbol for the Number Sign.

The International Language Substitution tables identify only specific character substitutions available in the selected language. Hex addresses not shown on the substitution tables use the character in the hex address shown on the standard character set matrix.

NOTE: The character examples provided in this Appendix are representative examples and not exact replications generated by the printer. Not all characters are available in all print modes.

IBM PC Character Set Charts

IBM PC Primary Character Set
P−Series Emulation (80−9F=Control Codes)

See the IBM−PC International Languages Substitution Table for the International Language selected.

NOTE: In the OCR−A print mode with ASCII International Language selected, the characters at addresses 5F, 60 and 7E will be replaced by the Fork, Chair, and Hook, respectively.

* IF ENABLED

B8*		0		0		0		0		0		0		0		0	
BITS B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
B4 B3 B2 B1	ROW	COLUMN 0		1		2		3		4		5		6		7	
0 0 0 0	0	NUL	0 0 0	DLE	20 16 10		40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1	SOH	1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2	STX	2 2 2	DC2	22 18 12	"	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3	ETX	3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4	EOT	4 4 4	DC4	24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	ENQ	5 5 5	NAK	25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6	ACK	6 6 6	SYN	26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7	ETB	27 23 17	'	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9	EM	31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 0 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 0 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 0 C	FS	34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	¦	174 124 7C
1 1 0 1	13	CR	15 13 0 D	GS	35 29 1D	–	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 0 E	RS	36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 0 F	US	37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F		177 127 7F

IBM PC Extended Set
P−Series Emulation (80−9F=Control Codes)

KEY

BITS B7 B6 B5 / B4 B3 B2 B1	0 0 1	
1 0 1 1	ESC	33 (OCTAL) 27 (DECIMAL) 1B (HEX)

ESC = CHARACTER

* IF ENABLED

B8*		1		1		1		1		1		1		1		1	
BITS B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
B4 B3 B2 B1	ROW	COLUMN 8		9		10		11		12		13		14		15	
0 0 0 0	0	NUL	200 128 80	DLE	220 144 90	á	240 160 A0	░	260 176 B0	└	300 192 C0	╨	320 208 D0	α	340 224 E0	≡	360 240 F0
0 0 0 1	1	SOH	201 129 81	DC1 (XON)	221 145 91	í	241 161 A1	▒	261 177 B1	┴	301 193 C1	╤	321 209 D1	β	341 225 E1	±	361 241 F1
0 0 1 0	2	STX	202 130 82	DC2	222 146 92	ó	242 162 A2	▓	262 178 B2	┬	302 194 C2	╥	322 210 D2	Γ	342 226 E2	≥	362 242 F2
0 0 1 1	3	ETX	203 131 83	DC3 (XOFF)	223 147 93	ú	243 163 A3	│	263 179 B3	├	303 195 C3	╙	323 211 D3	π	343 227 E3	≤	363 243 F3
0 1 0 0	4	EOT	204 132 84	DC4	224 148 94	ñ	244 164 A4	┤	264 180 B4	─	304 196 C4	╘	324 212 D4	Σ	344 228 E4	⌠	364 244 F4
0 1 0 1	5	ENQ	205 133 85	NAK	225 149 95	Ñ	245 165 A5	╡	265 181 B5	┼	305 197 C5	╒	325 213 D5	σ	345 229 E5	⌡	365 245 F5
0 1 1 0	6	ACK	206 134 86	SYN	226 150 96	a	246 166 A6	╢	266 182 B6	╞	306 198 C6	╓	326 214 D6	µ	346 230 E6	÷	366 246 F6
0 1 1 1	7	BEL	207 135 87	ETB	227 151 97	o	247 167 A7	╖	267 183 B7	╟	307 199 C7	╫	327 215 D7	τ	347 231 E7	≈	367 247 F7
1 0 0 0	8	BS	210 136 88	CAN	230 152 98	¿	250 168 A8	╕	270 184 B8	╚	310 200 C8	╪	330 216 D8	Φ	350 232 E8	°	370 248 F8
1 0 0 1	9	HT	211 137 89	EM	231 153 99	⌐	251 169 A9	╣	271 185 B9	╔	311 201 C9	┘	331 217 D9	Θ	351 233 E9	•	371 249 F9
1 0 1 0	10	LF	212 138 8A	SUB	232 154 9A	¬	252 170 AA	║	272 186 BA	╩	312 202 CA	┌	332 218 DA	Ω	352 234 EA	.	372 250 FA
1 0 1 1	11	VT	213 139 8B	ESC	233 155 9B	¿	253 171 AB	╗	273 187 BB	╦	313 203 CB	█	333 219 DB	δ	353 235 EB	√	373 251 FB
1 1 0 0	12	FF	214 140 8C	FS	234 156 9C	¿	254 172 AC	╝	274 188 BC	╠	314 204 CC	▄	334 220 DC	∞	354 236 EC	n	374 252 FC
1 1 0 1	13	CR	215 141 8D	GS	235 157 9D	¡	255 173 AD	╜	275 189 BD	═	315 205 CD	▌	335 221 DD	φ	355 237 ED	2	375 253 FD
1 1 1 0	14	SO	216 142 8E	RS	236 158 9E	<<	256 174 AE	╛	276 190 BE	╬	316 206 CE	▐	336 222 DE	∈	356 238 EE	■	376 254 FE
1 1 1 1	15	SI	217 143 8F	US	237 159 9F	>>	257 175 AF	┐	277 191 BF	╧	317 207 CF	▀	337 223 DF	∩	357 239 EF		377 255 FF

IBM PC Primary Character Set
P−Series Emulation (80−9F=Printable Symbols)

See the IBM−PC International Languages Substitution Table for the International Language selected.

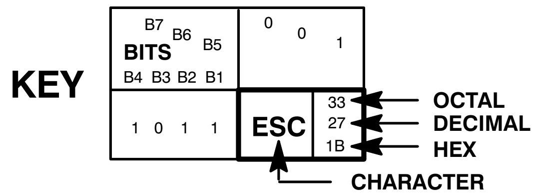
NOTE: In the OCR−A print mode with ASCII International Language selected, the characters at addresses 5F, 60 and 7E will be replaced by the Fork, Chair, and Hook, respectively.

* IF ENABLED

B8*		0		0		0		0		0		0		0		0	
BITS B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
B4 B3 B2 B1	ROW	COLUMN 0		1		2		3		4		5		6		7	
0 0 0 0	0	NUL	0 0 0	DLE	20 16 10		40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1	SOH	1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2	STX	2 2 2	DC2	22 18 12	"	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3	ETX	3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4	EOT	4 4 4	DC4	24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	ENQ	5 5 5	NAK	25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6	ACK	6 6 6	SYN	26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7	ETB	27 23 17	'	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9	EM	31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 0 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 0 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 0 C	FS	34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	¦	174 124 7C
1 1 0 1	13	CR	15 13 0 D	GS	35 29 1D	−	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 0 E	RS	36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 0 F	US	37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F		177 127 7F

IBM PC Extended Set
P−Series Emulation (80−9F=Printable Symbols)

KEY



* IF ENABLED

BITS B4 B3 B2 B1	ROW	8		9		10		11		12		13		14		15	
B8*		1		1		1		1		1		1		1		1	
B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
		COLUMN 8		9		10		11		12		13		14		15	
0 0 0 0	0	Ç	200 128 80	É	220 144 90	á	240 160 A0	░	260 176 B0	└	300 192 C0	╨	320 208 D0	α	340 224 E0	≡	360 240 F0
0 0 0 1	1	ü	201 129 81	æ	221 145 91	í	241 161 A1	▒	261 177 B1	┴	301 193 C1	╤	321 209 D1	β	341 225 E1	±	361 241 F1
0 0 1 0	2	é	202 130 82	Æ	222 146 92	ó	242 162 A2	▓	262 178 B2	┬	302 194 C2	╥	322 210 D2	Γ	342 226 E2	≥	362 242 F2
0 0 1 1	3	â	203 131 83	ô	223 147 93	ú	243 163 A3	│	263 179 B3	├	303 195 C3	╙	323 211 D3	π	343 227 E3	≤	363 243 F3
0 1 0 0	4	ä	204 132 84	ö	224 148 94	ñ	244 164 A4	┤	264 180 B4	─	304 196 C4	╘	324 212 D4	Σ	344 228 E4	⌠	364 244 F4
0 1 0 1	5	à	205 133 85	ò	225 149 95	Ñ	245 165 A5	╡	265 181 B5	┼	305 197 C5	╒	325 213 D5	σ	345 229 E5	⌡	365 245 F5
0 1 1 0	6	å	206 134 86	û	226 150 96	a	246 166 A6	╢	266 182 B6	╞	306 198 C6	╓	326 214 D6	µ	346 230 E6	÷	366 246 F6
0 1 1 1	7	ç	207 135 87	ù	227 151 97	o	247 167 A7	╖	267 183 B7	╟	307 199 C7	╫	327 215 D7	τ	347 231 E7	≈	367 247 F7
1 0 0 0	8	ê	210 136 88	ÿ	230 152 98	¿	250 168 A8	╕	270 184 B8	╚	310 200 C8	╪	330 216 D8	Φ	350 232 E8	°	370 248 F8
1 0 0 1	9	ë	211 137 89	Ö	231 153 99	⌐	251 169 A9	╣	271 185 B9	╔	311 201 C9	┘	331 217 D9	Θ	351 233 E9	•	371 249 F9
1 0 1 0	10	è	212 138 8A	Ü	232 154 9A	¬	252 170 AA	║	272 186 BA	╩	312 202 CA	┌	332 218 DA	Ω	352 234 EA	·	372 250 FA
1 0 1 1	11	ï	213 139 8B	’	233 155 9B	¿	253 171 AB	╗	273 187 BB	╦	313 203 CB	█	333 219 DB	δ	353 235 EB	√	373 251 FB
1 1 0 0	12	î	214 140 8C	£	234 156 9C	¿	254 172 AC	╝	274 188 BC	╠	314 204 CC	▄	334 220 DC	∞	354 236 EC	n	374 252 FC
1 1 0 1	13	ì	215 141 8D	¥	235 157 9D	¡	255 173 AD	╜	275 189 BD	═	315 205 CD	▌	335 221 DD	φ	355 237 ED	2	375 253 FD
1 1 1 0	14	Ä	216 142 8E	₧	236 158 9E	<<	256 174 AE	╛	276 190 BE	╬	316 206 CE	▐	336 222 DE	∈	356 238 EE	■	376 254 FE
1 1 1 1	15	Å	217 143 8F	ƒ	237 159 9F	>>	257 175 AF	┐	277 191 BF	╧	317 207 CF	▀	337 223 DF	∩	357 239 EF		377 255 FF

IBM PC Primary Character Set
Serial Matrix Emulation (80−9F=Control Codes)

See the IBM−PC International Languages Substitution Table for the International Language selected.

NOTE: In the OCR−A print mode with ASCII International Language selected, the characters at addresses 5F, 60 and 7E will be replaced by the Fork, Chair, and Hook, respectively.

* IF ENABLED

B8*		0		0		0		0		0		0		0		0	
B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
BITS B4 B3 B2 B1	ROW	COLUMN 0		1		2		3		4		5		6		7	
0 0 0 0	0	NUL	0 0 0	DLE	20 16 10		40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1	SOH	1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2	STX	2 2 2	DC2	22 18 12	″	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3	ETX	3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4	EOT	4 4 4	DC4	24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	ENQ	5 5 5	NAK	25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6	ACK	6 6 6	SYN	26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7	ETB	27 23 17	′	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9	EM	31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 0 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 0 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 0 C	FS	34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	¦	174 124 7C
1 1 0 1	13	CR	15 13 0 D	GS	35 29 1D	–	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 0 E	RS	36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 0 F	US	37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F	DEL	177 127 7F

IBM PC Extended Set
Serial Matrix Emulation (80−9F=Control Codes)

KEY

BITS B7 B6 B5 / B4 B3 B2 B1	0 0 1	
1 0 1 1	ESC	33 (OCTAL) 27 (DECIMAL) 1B (HEX)

CHARACTER

* IF ENABLED

B8*		1	1	1	1	1	1	1	1
BITS B7 B6 B5		0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1
B4 B3 B2 B1	ROW	COLUMN 8	9	10	11	12	13	14	15
0 0 0 0	0	NUL 200 128 80	DLE 220 144 90	á 240 160 A0	░ 260 176 B0	└ 300 192 C0	╨ 320 208 D0	α 340 224 E0	≡ 360 240 F0
0 0 0 1	1	SOH 201 129 81	DC1 (XON) 221 145 91	í 241 161 A1	▒ 261 177 B1	┴ 301 193 C1	╤ 321 209 D1	β 341 225 E1	± 361 241 F1
0 0 1 0	2	STX 202 130 82	DC2 222 146 92	ó 242 162 A2	▓ 262 178 B2	┬ 302 194 C2	╥ 322 210 D2	Γ 342 226 E2	≥ 362 242 F2
0 0 1 1	3	ETX 203 131 83	DC3 (XOFF) 223 147 93	ú 243 163 A3	│ 263 179 B3	├ 303 195 C3	╙ 323 211 D3	π 343 227 E3	≤ 363 243 F3
0 1 0 0	4	EOT 204 132 84	DC4 224 148 94	ñ 244 164 A4	┤ 264 180 B4	─ 304 196 C4	╘ 324 212 D4	Σ 344 228 E4	⌠ 364 244 F4
0 1 0 1	5	ENQ 205 133 85	NAK 225 149 95	Ñ 245 165 A5	╡ 265 181 B5	┼ 305 197 C5	╒ 325 213 D5	σ 345 229 E5	⌡ 365 245 F5
0 1 1 0	6	ACK 206 134 86	SYN 226 150 96	a 246 166 A6	╢ 266 182 B6	╞ 306 198 C6	╓ 326 214 D6	μ 346 230 E6	÷ 366 246 F6
0 1 1 1	7	BEL 207 135 87	ETB 227 151 97	o 247 167 A7	╖ 267 183 B7	╟ 307 199 C7	╫ 327 215 D7	τ 347 231 E7	≈ 367 247 F7
1 0 0 0	8	BS 210 136 88	CAN 230 152 98	¿ 250 168 A8	╕ 270 184 B8	╚ 310 200 C8	╪ 330 216 D8	Φ 350 232 E8	° 370 248 F8
1 0 0 1	9	HT 211 137 89	EM 231 153 99	⌐ 251 169 A9	╣ 271 185 B9	╔ 311 201 C9	┘ 331 217 D9	Θ 351 233 E9	• 371 249 F9
1 0 1 0	10	LF 212 138 8A	SUB 232 154 9A	¬ 252 170 AA	║ 272 186 BA	╩ 312 202 CA	┌ 332 218 DA	Ω 352 234 EA	· 372 250 FA
1 0 1 1	11	VT 213 139 8B	ESC 233 155 9B	¿ 253 171 AB	╗ 273 187 BB	╦ 313 203 CB	█ 333 219 DB	δ 353 235 EB	√ 373 251 FB
1 1 0 0	12	FF 214 140 8C	FS 234 156 9C	¿ 254 172 AC	╝ 274 188 BC	╠ 314 204 CC	▄ 334 220 DC	∞ 354 236 EC	n 374 252 FC
1 1 0 1	13	CR 215 141 8D	GS 235 157 9D	¡ 255 173 AD	╜ 275 189 BD	═ 315 205 CD	▌ 335 221 DD	φ 355 237 ED	2 375 253 FD
1 1 1 0	14	SO 216 142 8E	RS 236 158 9E	<< 256 174 AE	╛ 276 190 BE	╬ 316 206 CE	▐ 336 222 DE	∈ 356 238 EE	■ 376 254 FE
1 1 1 1	15	SI 217 143 8F	US 237 159 9F	>> 257 175 AF	┐ 277 191 BF	╧ 317 207 CF	▀ 337 223 DF	∩ 357 239 EF	377 255 FF

IBM PC Primary Character Set
Serial Matrix Emulation (80−9F=Printable Symbols)

See the IBM−PC International Languages Substitution Table for the International Language selected.

NOTE: In the OCR−A print mode with ASCII International Language selected, the characters at addresses 5F, 60 and 7E will be replaced by the Fork, Chair, and Hook, respectively.

* IF ENABLED

BITS																	
B8*		0		0		0		0		0		0		0		0	
B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
B4 B3 B2 B1	ROW	COLUMN 0		1		2		3		4		5		6		7	
0 0 0 0	0	NUL	0 0 0	DLE	20 16 10		40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1	SOH	1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2	STX	2 2 2	DC2	22 18 12	″	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3	♥	3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4	◆	4 4 4	DC4	24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	♣	5 5 5	§	25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6	♠	6 6 6	SYN	26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7	ETB	27 23 17	′	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9	EM	31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 0 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 0 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 0 C	FS	34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	¦	174 124 7C
1 1 0 1	13	CR	15 13 0 D	GS	35 29 1D	−	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 0 E	RS	36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 0 F	US	37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F	DEL	177 127 7F

IBM PC Extended Set
Serial Matrix Emulation (80−9F=Printable Symbols)

KEY

BITS B7 B6 B5 / B4 B3 B2 B1	0 0 1	
1 0 1 1	ESC	33 27 1B

33 → OCTAL
27 → DECIMAL
1B → HEX
ESC → CHARACTER

* IF ENABLED

B8*		1		1		1		1		1		1		1		1	
BITS B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
B4 B3 B2 B1	ROW	COLUMN 8		9		10		11		12		13		14		15	
0 0 0 0	0	Ç	200 128 80	É	220 144 90	á	240 160 A0	░	260 176 B0	└	300 192 C0	╨	320 208 D0	α	340 224 E0	≡	360 240 F0
0 0 0 1	1	ü	201 129 81	æ	221 145 91	í	241 161 A1	▒	261 177 B1	┴	301 193 C1	╤	321 209 D1	β	341 225 E1	±	361 241 F1
0 0 1 0	2	é	202 130 82	Æ	222 146 92	ó	242 162 A2	▓	262 178 B2	┬	302 194 C2	╥	322 210 D2	Γ	342 226 E2	≥	362 242 F2
0 0 1 1	3	â	203 131 83	ô	223 147 93	ú	243 163 A3	│	263 179 B3	├	303 195 C3	╙	323 211 D3	π	343 227 E3	≤	363 243 F3
0 1 0 0	4	ä	204 132 84	ö	224 148 94	ñ	244 164 A4	┤	264 180 B4	─	304 196 C4	╘	324 212 D4	Σ	344 228 E4	⌠	364 244 F4
0 1 0 1	5	à	205 133 85	ò	225 149 95	Ñ	245 165 A5	╡	265 181 B5	┼	305 197 C5	╒	325 213 D5	σ	345 229 E5	⌡	365 245 F5
0 1 1 0	6	å	206 134 86	û	226 150 96	a	246 166 A6	╢	266 182 B6	╞	306 198 C6	╓	326 214 D6	µ	346 230 E6	÷	366 246 F6
0 1 1 1	7	ç	207 135 87	ù	227 151 97	o	247 167 A7	╖	267 183 B7	╟	307 199 C7	╫	327 215 D7	τ	347 231 E7	≈	367 247 F7
1 0 0 0	8	ê	210 136 88	ÿ	230 152 98	¿	250 168 A8	╕	270 184 B8	╚	310 200 C8	╪	330 216 D8	Φ	350 232 E8	°	370 248 F8
1 0 0 1	9	ë	211 137 89	Ö	231 153 99	⌐	251 169 A9	╣	271 185 B9	╔	311 201 C9	┘	331 217 D9	Θ	351 233 E9	•	371 249 F9
1 0 1 0	10	è	212 138 8A	Ü	232 154 9A	¬	252 170 AA	║	272 186 BA	╩	312 202 CA	┌	332 218 DA	Ω	352 234 EA	.	372 250 FA
1 0 1 1	11	ï	213 139 8B	,	233 155 9B	¿	253 171 AB	╗	273 187 BB	╦	313 203 CB	█	333 219 DB	δ	353 235 EB	√	373 251 FB
1 1 0 0	12	î	214 140 8C	£	234 156 9C	¿	254 172 AC	╝	274 188 BC	╠	314 204 CC	▄	334 220 DC	∞	354 236 EC	n	374 252 FC
1 1 0 1	13	ì	215 141 8D	¥	235 157 9D	¡	255 173 AD	╜	275 189 BD	═	315 205 CD	▌	335 221 DD	φ	355 237 ED	2	375 253 FD
1 1 1 0	14	Ä	216 142 8E	₧	236 158 9E	<<	256 174 AE	╛	276 190 BE	╬	316 206 CE	▐	336 222 DE	∈	356 238 EE	■	376 254 FE
1 1 1 1	15	Å	217 143 8F	ƒ	237 159 9F	>>	257 175 AF	┐	277 191 BF	╧	317 207 CF	▀	337 223 DF	∩	357 239 EF		377 255 FF

IBM PC International Languages Substitution Table

	Hex Address												
LANGUAGE	**0023**	**0024**	**0040**	**005B**	**005C**	**005D**	**005E**	**005F**	**0060**	**007B**	**007C**	**007D**	**007E**
ASCII	#	$	@	[	\	]	^	_	`	{	¦	}	~
French	#	$	à	°	ç	§	^	_	`	é	ù	è	¨
German	#	$	§	Ä	Ö	Ü	^	_	`	ä	ö	ü	β
English	£	$	@	[	\	]	^	_	`	{	¦	}	~
Danish	#	$	@	Æ	Ø	Å	^	_	`	æ	ø	å	~
Swedish	#	¤	É	Ä	Ö	Å	Ü	_	é	ä	ö	å	ü
Italian	#	$	@	°	\	é	^	_	ù	à	ò	è	ì
Spanish	₧	$	@	¡	Ñ	¿	^	_	`	¨	ñ	}	~
Japanese	#	$	@	[	¥	]	^	_	`	{	¦	}	~
French Canadian	#	$	à	â	ç	ê	î	_	ô	é	ù	è	û
Latin American	#	$	@	[	Ñ	]	ú	ñ	í	ó	á	é	ü

Example: *005B = [in ASCII*
005B = Æ in Danish

Multinational Character Set Charts

NOTE: The OCR charts indicate appropriate character codes only and do not represent the actual character style and shape.

Multinational Primary Character Set
P−Series Emulation (80−9F=Control Codes)

See the Multinational International Languages Substitution Table for the International Language selected.

* IF ENABLED

BITS B4 B3 B2 B1	ROW	COLUMN 0		1		2		3		4		5		6		7	
B8*		0		0		0		0		0		0		0		0	
B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
0 0 0 0	0	NUL	0 0 0	DLE	20 16 10		40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1	SOH	1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2	STX	2 2 2	DC2	22 18 12	"	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3	ETX	3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4	EOT	4 4 4	DC4	24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	ENQ	5 5 5	NAK	25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6	ACK	6 6 6	SYN	26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7	ETB	27 23 17	'	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9	EM	31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 0 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 0 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 0 C	FS	34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	¦	174 124 7C
1 1 0 1	13	CR	15 13 0 D	GS	35 29 1D	–	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 0 E	RS	36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 0 F	US	37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F		177 127 7F

Multinational Extended Set
P−Series Emulation (80−9F=Control Codes)

KEY

BITS B7 B6 B5 / B4 B3 B2 B1	0 0 1		
1 0 1 1	ESC	33 27 1B	← OCTAL ← DECIMAL ← HEX

↑ CHARACTER

* IF ENABLED

B8*	1		1		1		1		1		1		1		1	
BITS B7 B6 B5	0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
B4 B3 B2 B1 / ROW	COLUMN 8		9		10		11		12		13		14		15	
0 0 0 0 / 0	NUL	200 128 80	DLE	220 144 90	█	240 160 A0	°	260 176 B0	À	300 192 C0	Đ	320 208 D0	à	340 224 E0	đ	360 240 F0
0 0 0 1 / 1	SOH	201 129 81	DC1 (XON)	221 145 91	¡	241 161 A1	±	261 177 B1	Á	301 193 C1	Ñ	321 209 D1	á	341 225 E1	ñ	361 241 F1
0 0 1 0 / 2	STX	202 130 82	DC2	222 146 92	’	242 162 A2	2	262 178 B2	Â	302 194 C2	Ò	322 210 D2	â	342 226 E2	ò	362 242 F2
0 0 1 1 / 3	ETX	203 131 83	DC3 (XOFF)	223 147 93	£	243 163 A3	3	263 179 B3	Ã	303 195 C3	Ó	323 211 D3	ã	343 227 E3	ó	363 243 F3
0 1 0 0 / 4	EOT	204 132 84	DC4	224 148 94	¤	244 164 A4	′	264 180 B4	Ä	304 196 C4	Ô	324 212 D4	ä	344 228 E4	ô	364 244 F4
0 1 0 1 / 5	ENQ	205 133 85	NAK	225 149 95	¥	245 165 A5	µ	265 181 B5	Å	305 197 C5	Õ	325 213 D5	å	345 229 E5	õ	365 245 F5
0 1 1 0 / 6	ACK	206 134 86	SYN	226 150 96	¦	246 166 A6	¶	266 182 B6	Æ	306 198 C6	Ö	326 214 D6	æ	346 230 E6	ö	366 246 F6
0 1 1 1 / 7	BEL	207 135 87	ETB	227 151 97	§	247 167 A7	·	267 183 B7	Ç	307 199 C7	=	327 215 D7	ç	347 231 E7	₧	367 247 F7
1 0 0 0 / 8	BS	210 136 88	CAN	230 152 98	″	250 168 A8	¸	270 184 B8	È	310 200 C8	Ø	330 216 D8	è	350 232 E8	ø	370 248 F8
1 0 0 1 / 9	HT	211 137 89	EM	231 153 99	ƒ	251 169 A9	1	271 185 B9	É	311 201 C9	Ù	331 217 D9	é	351 233 E9	ù	371 249 F9
1 0 1 0 / 10	LF	212 138 8A	SUB	232 154 9A	a	252 170 AA	o	272 186 BA	Ê	312 202 CA	Ú	332 218 DA	ê	352 234 EA	ú	372 250 FA
1 0 1 1 / 11	VT	213 139 8B	ESC	233 155 9B	<<	253 171 AB	>>	273 187 BB	Ë	313 203 CB	Û	333 219 DB	ë	353 235 EB	û	373 251 FB
1 1 0 0 / 12	FF	214 140 8C	FS	234 156 9C	¬	254 172 AC	¿	274 188 BC	Ì	314 204 CC	Ü	334 220 DC	ì	354 236 EC	ü	374 252 FC
1 1 0 1 / 13	CR	215 141 8D	GS	235 157 9D	ÿ	255 173 AD	¿	275 189 BD	Í	315 205 CD	Ý	335 221 DD	í	355 237 ED	ý	375 253 FD
1 1 1 0 / 14	SO	216 142 8E	RS	236 158 9E	®	256 174 AE	¾	276 190 BE	Î	316 206 CE	¿	336 222 DE	î	356 238 EE	¿	376 254 FE
1 1 1 1 / 15	SI	217 143 8F	US	237 159 9F	—	257 175 AF	¿	277 191 BF	Ï	317 207 CF	β	337 223 DF	ï	357 239 EF	ˇ	377 255 FF

Multinational Primary Character Set
P−Series Emulation (80−9F=Printable Symbols)

See the Multinational International Languages Substitution Table for the International Language selected.

* IF ENABLED

BITS		COLUMN 0		1		2		3		4		5		6		7	
B8*		0		0		0		0		0		0		0		0	
B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
B4 B3 B2 B1	ROW																
0 0 0 0	0	NUL	0 0 0	DLE	20 16 10		40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1	SOH	1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2	STX	2 2 2	DC2	22 18 12	″	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3	ETX	3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4	EOT	4 4 4	DC4	24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	ENQ	5 5 5	NAK	25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6	ACK	6 6 6	SYN	26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7	ETB	27 23 17	′	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9	EM	31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 0A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 0B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 0C	FS	34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	¦	174 124 7C
1 1 0 1	13	CR	15 13 0D	GS	35 29 1D	–	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 0E	RS	36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 0F	US	37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F		177 127 7F

Multinational Extended Set
P−Series Emulation (80−9F=Printable Symbols)

KEY

B7 B6 B5 BITS B4 B3 B2 B1	0 0 1	
1 0 1 1	ESC	33 (OCTAL) 27 (DECIMAL) 1B (HEX)

ESC = CHARACTER

* IF ENABLED

B8*		1		1		1		1		1		1		1		1	
BITS B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
B4 B3 B2 B1	ROW	COLUMN 8		9		10		11		12		13		14		15	
0 0 0 0	0	¿	200 128 80	̄*	220 144 90	█	240 160 A0	°	260 176 B0	À	300 192 C0	Đ	320 208 D0	à	340 224 E0	đ	360 240 F0
0 0 0 1	1	¿	201 129 81	█	221 145 91	¡	241 161 A1	±	261 177 B1	Á	301 193 C1	Ñ	321 209 D1	á	341 225 E1	ñ	361 241 F1
0 0 1 0	2	₧	202 130 82		222 146 92	‚	242 162 A2	2	262 178 B2	Â	302 194 C2	Ò	322 210 D2	â	342 226 E2	ò	362 242 F2
0 0 1 1	3	|	203 131 83		223 147 93	£	243 163 A3	3	263 179 B3	Ã	303 195 C3	Ó	323 211 D3	ã	343 227 E3	ó	363 243 F3
0 1 0 0	4	π	204 132 84		224 148 94	¤	244 164 A4	´	264 180 B4	Ä	304 196 C4	Ô	324 212 D4	ä	344 228 E4	ô	364 244 F4
0 1 0 1	5	ı	205 133 85		225 149 95	¥	245 165 A5	µ	265 181 B5	Å	305 197 C5	Õ	325 213 D5	å	345 229 E5	õ	365 245 F5
0 1 1 0	6	Ğ	206 134 86		226 150 96	|	246 166 A6	¶	266 182 B6	Æ	306 198 C6	Ö	326 214 D6	æ	346 230 E6	ö	366 246 F6
0 1 1 1	7	ğ	207 135 87		227 151 97	§	247 167 A7	·	267 183 B7	Ç	307 199 C7	═	327 215 D7	ç	347 231 E7	₧	367 247 F7
1 0 0 0	8	Ş	210 136 88		230 152 98	″	250 168 A8	¸	270 184 B8	È	310 200 C8	Ø	330 216 D8	è	350 232 E8	ø	370 248 F8
1 0 0 1	9	ş	211 137 89		231 153 99	ƒ	251 169 A9	1	271 185 B9	É	311 201 C9	Ù	331 217 D9	é	351 233 E9	ù	371 249 F9
1 0 1 0	10	İ	212 138 8A		232 154 9A	a	252 170 AA	o	272 186 BA	Ê	312 202 CA	Ú	332 218 DA	ê	352 234 EA	ú	372 250 FA
1 0 1 1	11	¨	213 139 8B		233 155 9B	<<	253 171 AB	>>	273 187 BB	Ë	313 203 CB	Û	333 219 DB	ë	353 235 EB	û	373 251 FB
1 1 0 0	12	ˇ	214 140 8C		234 156 9C	¬	254 172 AC	¿	274 188 BC	Ì	314 204 CC	Ü	334 220 DC	ì	354 236 EC	ü	374 252 FC
1 1 0 1	13	ƒ	215 141 8D		235 157 9D	ÿ	255 173 AD	¿	275 189 BD	Í	315 205 CD	Ý	335 221 DD	í	355 237 ED	ý	375 253 FD
1 1 1 0	14	═	216 142 8E		236 158 9E	®	256 174 AE	¾	276 190 BE	Î	316 206 CE	¿	336 222 DE	î	356 238 EE	¿	376 254 FE
1 1 1 1	15	̄;	217 143 8F		237 159 9F	—	257 175 AF	¿	277 191 BF	Ï	317 207 CF	β	337 223 DF	ï	357 239 EF	ˇ	377 255 FF

Multinational Primary Character Set
Serial Matrix Emulation (80−9F=Control Codes)

See the Multinational International Languages Substitution Table for the International Language selected.

* IF ENABLED

BITS B4 B3 B2 B1	ROW																
B8*		0		0		0		0		0		0		0		0	
B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
	COLUMN	0		1		2		3		4		5		6		7	
0 0 0 0	0	NUL	0 0 0	DLE	20 16 10		40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1	SOH	1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2	STX	2 2 2	DC2	22 18 12	″	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3	ETX	3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4	EOT	4 4 4	DC4	24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	ENQ	5 5 5	NAK	25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6	ACK	6 6 6	SYN	26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7	ETB	27 23 17	′	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9	EM	31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 0 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 0 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 0 C	FS	34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	¦	174 124 7C
1 1 0 1	13	CR	15 13 0 D	GS	35 29 1D	−	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 0 E	RS	36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 0 F	US	37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F	DEL	177 127 7F

Multinational Extended Set
Serial Matrix Emulation (80−9F=Control Codes)

KEY

BITS B7 B6 B5 / B4 B3 B2 B1	0 0 1	
1 0 1 1	ESC	33 (OCTAL) 27 (DECIMAL) 1B (HEX)

CHARACTER

* IF ENABLED

BITS B4 B3 B2 B1	ROW	8		9		10		11		12		13		14		15	
B8*		1		1		1		1		1		1		1		1	
B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
0 0 0 0	0	NUL	200 128 80	DLE	220 144 90	█	240 160 A0	°	260 176 B0	À	300 192 C0	Đ	320 208 D0	à	340 224 E0	đ	360 240 F0
0 0 0 1	1	SOH	201 129 81	DC1 (XON)	221 145 91	¡	241 161 A1	±	261 177 B1	Á	301 193 C1	Ñ	321 209 D1	á	341 225 E1	ñ	361 241 F1
0 0 1 0	2	STX	202 130 82	DC2	222 146 92	’	242 162 A2	²	262 178 B2	Â	302 194 C2	Ò	322 210 D2	â	342 226 E2	ò	362 242 F2
0 0 1 1	3	ETX	203 131 83	DC3 (XOFF)	223 147 93	£	243 163 A3	³	263 179 B3	Ã	303 195 C3	Ó	323 211 D3	ã	343 227 E3	ó	363 243 F3
0 1 0 0	4	EOT	204 132 84	DC4	224 148 94	¤	244 164 A4	´	264 180 B4	Ä	304 196 C4	Ô	324 212 D4	ä	344 228 E4	ô	364 244 F4
0 1 0 1	5	ENQ	205 133 85	NAK	225 149 95	¥	245 165 A5	µ	265 181 B5	Å	305 197 C5	Õ	325 213 D5	å	345 229 E5	õ	365 245 F5
0 1 1 0	6	ACK	206 134 86	SYN	226 150 96	¦	246 166 A6	¶	266 182 B6	Æ	306 198 C6	Ö	326 214 D6	æ	346 230 E6	ö	366 246 F6
0 1 1 1	7	BEL	207 135 87	ETB	227 151 97	§	247 167 A7	·	267 183 B7	Ç	307 199 C7	=	327 215 D7	ç	347 231 E7	₧	367 247 F7
1 0 0 0	8	BS	210 136 88	CAN	230 152 98	″	250 168 A8	¸	270 184 B8	È	310 200 C8	Ø	330 216 D8	è	350 232 E8	ø	370 248 F8
1 0 0 1	9	HT	211 137 89	EM	231 153 99	ƒ	251 169 A9	¹	271 185 B9	É	311 201 C9	Ù	331 217 D9	é	351 233 E9	ù	371 249 F9
1 0 1 0	10	LF	212 138 8A	SUB	232 154 9A	a	252 170 AA	o	272 186 BA	Ê	312 202 CA	Ú	332 218 DA	ê	352 234 EA	ú	372 250 FA
1 0 1 1	11	VT	213 139 8B	ESC	233 155 9B	<<	253 171 AB	>>	273 187 BB	Ë	313 203 CB	Û	333 219 DB	ë	353 235 EB	û	373 251 FB
1 1 0 0	12	FF	214 140 8C	FS	234 156 9C	¬	254 172 AC	⍰	274 188 BC	Ì	314 204 CC	Ü	334 220 DC	ì	354 236 EC	ü	374 252 FC
1 1 0 1	13	CR	215 141 8D	GS	235 157 9D	ÿ	255 173 AD	⍰	275 189 BD	Í	315 205 CD	Ý	335 221 DD	í	355 237 ED	ý	375 253 FD
1 1 1 0	14	SO	216 142 8E	RS	236 158 9E	®	256 174 AE	¾	276 190 BE	Î	316 206 CE	⍰	336 222 DE	î	356 238 EE	⍰	376 254 FE
1 1 1 1	15	SI	217 143 8F	US	237 159 9F	—	257 175 AF	¿	277 191 BF	Ï	317 207 CF	β	337 223 DF	ï	357 239 EF	ˇ	377 255 FF

Multinational Primary Character Set
Serial Matrix Emulation (80−9F=Printable Symbols)

See the Multinational International Languages Substitution Table for the International Language selected.

* IF ENABLED

B8*		0		0		0		0		0		0		0		0	
BITS B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
B4 B3 B2 B1	ROW	COLUMN 0		1		2		3		4		5		6		7	
0 0 0 0	0	NUL	0 0 0	DLE	20 16 10		40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1	SOH	1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2	STX	2 2 2	DC2	22 18 12	″	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3		3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4		4 4 4	DC4	24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5		5 5 5		25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6		6 6 6	SYN	26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7	ETB	27 23 17	′	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9	EM	31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 0 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 0 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 0 C	FS	34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	¦	174 124 7C
1 1 0 1	13	CR	15 13 0 D	GS	35 29 1D	–	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 0 E	RS	36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 0 F	US	37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F	DEL	177 127 7F

Multinational Extended Set
Serial Matrix Emulation (80−9F=Printable Symbols)

KEY

BITS B7 B6 B5 / B4 B3 B2 B1	0 0 1
1 0 1 1	ESC — 33 (OCTAL), 27 (DECIMAL), 1B (HEX); ESC = CHARACTER

* IF ENABLED

BITS B4 B3 B2 B1	ROW	8		9		10		11		12		13		14		15	
B8*		1		1		1		1		1		1		1		1	
B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
0 0 0 0	0	¿	200 128 80	‾*	220 144 90	█	240 160 A0	°	260 176 B0	À	300 192 C0	Đ	320 208 D0	à	340 224 E0	đ	360 240 F0
0 0 0 1	1	¿	201 129 81	█	221 145 91	¡	241 161 A1	±	261 177 B1	Á	301 193 C1	Ñ	321 209 D1	á	341 225 E1	ñ	361 241 F1
0 0 1 0	2	₧	202 130 82		222 146 92	‚	242 162 A2	²	262 178 B2	Â	302 194 C2	Ò	322 210 D2	â	342 226 E2	ò	362 242 F2
0 0 1 1	3	|	203 131 83		223 147 93	£	243 163 A3	³	263 179 B3	Ã	303 195 C3	Ó	323 211 D3	ã	343 227 E3	ó	363 243 F3
0 1 0 0	4	π	204 132 84		224 148 94	¤	244 164 A4	´	264 180 B4	Ä	304 196 C4	Ô	324 212 D4	ä	344 228 E4	ô	364 244 F4
0 1 0 1	5	ı	205 133 85		225 149 95	¥	245 165 A5	µ	265 181 B5	Å	305 197 C5	Õ	325 213 D5	å	345 229 E5	õ	365 245 F5
0 1 1 0	6	Ğ	206 134 86		226 150 96	|	246 166 A6	¶	266 182 B6	Æ	306 198 C6	Ö	326 214 D6	æ	346 230 E6	ö	366 246 F6
0 1 1 1	7	ğ	207 135 87		227 151 97	§	247 167 A7	·	267 183 B7	Ç	307 199 C7	═	327 215 D7	ç	347 231 E7	₧	367 247 F7
1 0 0 0	8	Ş	210 136 88		230 152 98	″	250 168 A8	¸	270 184 B8	È	310 200 C8	Ø	330 216 D8	è	350 232 E8	ø	370 248 F8
1 0 0 1	9	ş	211 137 89		231 153 99	ƒ	251 169 A9	¹	271 185 B9	É	311 201 C9	Ù	331 217 D9	é	351 233 E9	ù	371 249 F9
1 0 1 0	10	İ	212 138 8A		232 154 9A	a	252 170 AA	o	272 186 BA	Ê	312 202 CA	Ú	332 218 DA	ê	352 234 EA	ú	372 250 FA
1 0 1 1	11	¨	213 139 8B		233 155 9B	<<	253 171 AB	>>	273 187 BB	Ë	313 203 CB	Û	333 219 DB	ë	353 235 EB	û	373 251 FB
1 1 0 0	12	ˇ	214 140 8C		234 156 9C	¬	254 172 AC	¿	274 188 BC	Ì	314 204 CC	Ü	334 220 DC	ì	354 236 EC	ü	374 252 FC
1 1 0 1	13	ƒ	215 141 8D		235 157 9D	ÿ	255 173 AD	¿	275 189 BD	Í	315 205 CD	Ý	335 221 DD	í	355 237 ED	ý	375 253 FD
1 1 1 0	14	═	216 142 8E		236 158 9E	®	256 174 AE	¾	276 190 BE	Î	316 206 CE	¿	336 222 DE	î	356 238 EE	¿	376 254 FE
1 1 1 1	15	‾;	217 143 8F		237 159 9F	—	257 175 AF	¿	277 191 BF	Ï	317 207 CF	β	337 223 DF	ï	357 239 EF	ˇ	377 255 FF

Multinational Primary Character Set in OCR–A

See the Multinational International Languages Substitution Table for the International Language selected.

NOTE: OCR–A characters can only be selected when using the OCR–A print mode. The OCR charts indicate appropriate character codes only and do not represent the actual character style and shape. Regular print attributes (such as bold, super/subscript, emphasized, etc.) are not functional in this mode.

* IF ENABLED

B8*		0		0		0		0		0		0		0		0	
B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
BITS B4 B3 B2 B1	ROW	COLUMN 0		1		2		3		4		5		6		7	
0 0 0 0	0	NUL	0 0 0	DLE	20 16 10		40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	\`	140 96 60	p	160 112 70
0 0 0 1	1	SOH	1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2	STX	2 2 2	DC2	22 18 12	″	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3	ETX	3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4	EOT	4 4 4	DC4	24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	ENQ	5 5 5	NAK	25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6	ACK	6 6 6	SYN	26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7	ETB	27 23 17	′	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9	EM	31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 0 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 0 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 0 C	FS	34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	¦	174 124 7C
1 1 0 1	13	CR	15 13 0 D	GS	35 29 1D	–	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 0 E	RS	36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 0 F	US	37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F		177 127 7F

Multinational Extended Character Set in OCR−A

NOTE: P−Series and Serial Matrix Control Codes and Printable Symbols for the OCR−A character set are identical to the Multinational Character Set charts shown on pages B−12 through B−19.

KEY

B7 B6 B5 BITS / B4 B3 B2 B1	0 0 1	
1 0 1 1	ESC	33 27 1B

OCTAL / DECIMAL / HEX — CHARACTER

* IF ENABLED

B8*			1		1		1		1		1		1		1		1	
B7 B6 B5 BITS			0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
B4 B3 B2 B1	ROW	COLUMN	8		9		10		11		12		13		14		15	
0 0 0 0	0			200 128 80		220 144 90		240 160 A0		260 176 B0		300 192 C0		320 208 D0		340 224 E0		360 240 F0
0 0 0 1	1			201 129 81		221 145 91		241 161 A1		261 177 B1		301 193 C1	Ñ	321 209 D1		341 225 E1		361 241 F1
0 0 1 0	2			202 130 82		222 146 92		242 162 A2		262 178 B2		302 194 C2		322 210 D2		342 226 E2		362 242 F2
0 0 1 1	3			203 131 83		223 147 93	£	243 163 A3		263 179 B3		303 195 C3	ȯ	323 211 D3		343 227 E3		363 243 F3
0 1 0 0	4			204 132 84		224 148 94		244 164 A4		264 180 B4	Ä	304 196 C4	⑂	324 212 D4	ä	344 228 E4	⑁	364 244 F4
0 1 0 1	5			205 133 85		225 149 95	¥	245 165 A5		265 181 B5	Å	305 197 C5		325 213 D5	å	345 229 E5		365 245 F5
0 1 1 0	6			206 134 86		226 150 96	|	246 166 A6		266 182 B6	Æ	306 198 C6	Ö	326 214 D6	æ	346 230 E6	ö	366 246 F6
0 1 1 1	7			207 135 87		227 151 97		247 167 A7		267 183 B7		307 199 C7		327 215 D7		347 231 E7		367 247 F7
1 0 0 0	8			210 136 88		230 152 98		250 168 A8	¬	270 184 B8	_	310 200 C8	Ø	330 216 D8		350 232 E8		370 248 F8
1 0 0 1	9			211 137 89		231 153 99		251 169 A9		271 185 B9		311 201 C9		331 217 D9		351 233 E9		371 249 F9
1 0 1 0	10			212 138 8A		232 154 9A		252 170 AA		272 186 BA	I	312 202 CA		332 218 DA		352 234 EA		372 250 FA
1 0 1 1	11			213 139 8B		233 155 9B		253 171 AB		273 187 BB	I	313 203 CB		333 219 DB		353 235 EB	⑀	373 251 FB
1 1 0 0	12			214 140 8C		234 156 9C		254 172 AC		274 188 BC		314 204 CC	Ü	334 220 DC		354 236 EC	ü	374 252 FC
1 1 0 1	13			215 141 8D		235 157 9D	^	255 173 AD		275 189 BD	⊥	315 205 CD		335 221 DD		355 237 ED		375 253 FD
1 1 1 0	14			216 142 8E		236 158 9E		256 174 AE		276 190 BE	−	316 206 CE		336 222 DE		356 238 EE		376 254 FE
1 1 1 1	15			217 143 8F		237 159 9F	–	257 175 AF		277 191 BF		317 207 CF		337 223 DF		357 239 EF		377 255 FF

Multinational Primary Character Set in OCR–B

See the Multinational International Languages Substitution Table for the International Language selected.

NOTE: OCR–B characters can only be selected when using the OCR–B print mode. The OCR charts indicate appropriate character codes only and do not represent the actual character style and shape. Regular print attributes (such as bold, super/subscript, emphasized, etc.) are not functional in this mode.

* IF ENABLED

B8*		0		0		0		0		0		0		0		0	
BITS B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
B4 B3 B2 B1	ROW	COLUMN 0		1		2		3		4		5		6		7	
0 0 0 0	0	NUL	0 0 0	DLE	20 16 10		40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1	SOH	1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2	STX	2 2 2	DC2	22 18 12	″	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3	ETX	3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4	EOT	4 4 4	DC4	24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	ENQ	5 5 5	NAK	25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6	ACK	6 6 6	SYN	26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7	ETB	27 23 17	'	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9	EM	31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 0 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 0 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 0 C	FS	34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	¦	174 124 7C
1 1 0 1	13	CR	15 13 0 D	GS	35 29 1D	–	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 0 E	RS	36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 0 F	US	37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F		177 127 7F

NOTE: P−Series and Serial Matrix Control Codes and Printable Symbols for the OCR−B character set are identical to the Multinational Character Set charts shown on pages B−12 through B−19.

KEY

B7 B6 B5 BITS B4 B3 B2 B1	0 0 1	
1 0 1 1	ESC	33 27 1B

OCTAL (33) · DECIMAL (27) · HEX (1B) · CHARACTER (ESC)

* IF ENABLED

B8*		1		1		1		1		1		1		1		1	
BITS B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
B4 B3 B2 B1	ROW	COLUMN 8		9		10		11		12		13		14		15	
0 0 0 0	0		200 128 80		220 144 90		240 160 A0		260 176 B0	↑	300 192 C0	Z	320 208 D0		340 224 E0	z	360 240 F0
0 0 0 1	1		201 129 81		221 145 91	¡	241 161 A1		261 177 B1	↓	301 193 C1	Ñ	321 209 D1		341 225 E1		361 241 F1
0 0 1 0	2		202 130 82		222 146 92		242 162 A2		262 178 B2	→	302 194 C2		322 210 D2		342 226 E2		362 242 F2
0 0 1 1	3		203 131 83		223 147 93	£	243 163 A3		263 179 B3		303 195 C3	ȯ	323 211 D3		343 227 E3		363 243 F3
0 1 0 0	4		204 132 84		224 148 94	¤	244 164 A4	,	264 180 B4	Ä	304 196 C4		324 212 D4	ä	344 228 E4		364 244 F4
0 1 0 1	5		205 133 85		225 149 95	¥	245 165 A5		265 181 B5	Å	305 197 C5		325 213 D5	å	345 229 E5		365 245 F5
0 1 1 0	6		206 134 86		226 150 96	|	246 166 A6		266 182 B6	Æ	306 198 C6	Ö	326 214 D6	æ	346 230 E6	ö	366 246 F6
0 1 1 1	7		207 135 87		227 151 97	§	247 167 A7		267 183 B7		307 199 C7		327 215 D7	ç	347 231 E7		367 247 F7
1 0 0 0	8		210 136 88		230 152 98		250 168 A8	–	270 184 B8	_	310 200 C8	Ø	330 216 D8		350 232 E8	ø	370 248 F8
1 0 0 1	9		211 137 89		231 153 99		251 169 A9		271 185 B9		311 201 C9		331 217 D9	é	351 233 E9		371 249 F9
1 0 1 0	10		212 138 8A		232 154 9A		252 170 AA		272 186 BA	I	312 202 CA		332 218 DA	ë	352 234 EA		372 250 FA
1 0 1 1	11	¨	213 139 8B		233 155 9B		253 171 AB		273 187 BB	I	313 203 CB		333 219 DB		353 235 EB		373 251 FB
1 1 0 0	12		214 140 8C		234 156 9C		254 172 AC		274 188 BC		314 204 CC	Ü	334 220 DC		354 236 EC		374 252 FC
1 1 0 1	13		215 141 8D		235 157 9D	^	255 173 AD		275 189 BD	_I	315 205 CD	¿	335 221 DD		355 237 ED	¿	375 253 FD
1 1 1 0	14		216 142 8E		236 158 9E		256 174 AE		276 190 BE	–	316 206 CE		336 222 DE		356 238 EE		376 254 FE
1 1 1 1	15		217 143 8F		237 159 9F	–	257 175 AF	¿	277 191 BF	_	317 207 CF	β	337 223 DF		357 239 EF		377 255 FF

Multinational International Languages Substitution Table

<table>
<tr><th></th><th colspan="3">Hex Address</th></tr>
<tr><th>LANGUAGE</th><th>005B</th><th>005D</th><th>005E</th></tr>
<tr><td>ASCII</td><td>[</td><td>]</td><td>^</td></tr>
<tr><td>EBCDIC</td><td>’</td><td>|</td><td>¬</td></tr>
</table>

Example: *005B = [in ASCII*
005B = ¢ in EBCDIC

ECMA−94 Latin 1 Character Set Charts

ECMA−94 Latin 1 Primary Character Set
P−Series Emulation (80−9F=Control Codes)

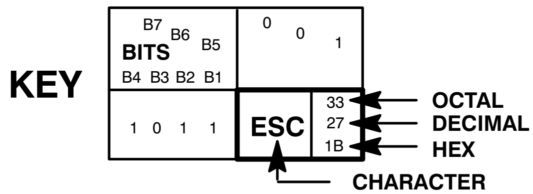
See the ECMA 94 Latin 1 International Languages Substitution Table for the International Language selected.

NOTE: In the OCR−A print mode with ASCII International Language selected, the characters at addresses 5F, 60 and 7E will be replaced by the Fork, Chair, and Hook, respectively.

* IF ENABLED

B8*		0		0		0		0		0		0		0		0	
BITS B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
B4 B3 B2 B1	ROW	COLUMN 0		1		2		3		4		5		6		7	
0 0 0 0	0	NUL	0 0 0	DLE	20 16 10		40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1	SOH	1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2	STX	2 2 2	DC2	22 18 12	″	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3	ETX	3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4	EOT	4 4 4	DC4	24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	ENQ	5 5 5	NAK	25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6	ACK	6 6 6	SYN	26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7	ETB	27 23 17	′	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9	EM	31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 0 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 0 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 0 C	FS	34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	|	174 124 7C
1 1 0 1	13	CR	15 13 0 D	GS	35 29 1D	–	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 0 E	RS	36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 0 F	US	37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F		177 127 7F

ECMA−94 Latin 1 European Extended Set: Barcode
P−Series Emulation (80−9F=Control Codes)



* IF ENABLED

B8*		1		1		1		1		1		1		1		1	
BITS B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
B4 B3 B2 B1	ROW	COLUMN 8		9		10		11		12		13		14		15	
0 0 0 0	0	NUL	200 128 80	DLE	220 144 90		240 160 A0		260 176 B0		300 192 C0		320 208 D0		340 224 E0		360 240 F0
0 0 0 1	1	SOH	201 129 81	DC1 (XON)	221 145 91		241 161 A1		261 177 B1		301 193 C1		321 209 D1		341 225 E1		361 241 F1
0 0 1 0	2	STX	202 130 82	DC2	222 146 92		242 162 A2		262 178 B2		302 194 C2		322 210 D2		342 226 E2		362 242 F2
0 0 1 1	3	ETX	203 131 83	DC3 (XOFF)	223 147 93		243 163 A3		263 179 B3		303 195 C3		323 211 D3		343 227 E3		363 243 F3
0 1 0 0	4	EOT	204 132 84	DC4	224 148 94		244 164 A4		264 180 B4		304 196 C4		324 212 D4		344 228 E4		364 244 F4
0 1 0 1	5	ENQ	205 133 85	NAK	225 149 95		245 165 A5		265 181 B5		305 197 C5		325 213 D5		345 229 E5		365 245 F5
0 1 1 0	6	ACK	206 134 86	SYN	226 150 96		246 166 A6		266 182 B6		306 198 C6		326 214 D6		346 230 E6		366 246 F6
0 1 1 1	7	BEL	207 135 87	ETB	227 151 97		247 167 A7		267 183 B7		307 199 C7		327 215 D7		347 231 E7		367 247 F7
1 0 0 0	8	BS	210 136 88	CAN	230 152 98		250 168 A8		270 184 B8		310 200 C8		330 216 D8		350 232 E8		370 248 F8
1 0 0 1	9	HT	211 137 89	EM	231 153 99		251 169 A9		271 185 B9		311 201 C9		331 217 D9		351 233 E9		371 249 F9
1 0 1 0	10	LF	212 138 8A	SUB	232 154 9A		252 170 AA		272 186 BA		312 202 CA		332 218 DA		352 234 EA		372 250 FA
1 0 1 1	11	VT	213 139 8B	ESC	233 155 9B		253 171 AB		273 187 BB		313 203 CB		333 219 DB		353 235 EB		373 251 FB
1 1 0 0	12	FF	214 140 8C	FS	234 156 9C		254 172 AC		274 188 BC		314 204 CC		334 220 DC		354 236 EC		374 252 FC
1 1 0 1	13	CR	215 141 8D	GS	235 157 9D		255 173 AD		275 189 BD		315 205 CD		335 221 DD		355 237 ED		375 253 FD
1 1 1 0	14	SO	216 142 8E	RS	236 158 9E		256 174 AE		276 190 BE		316 206 CE		336 222 DE		356 238 EE		376 254 FE
1 1 1 1	15	SI	217 143 8F	US	237 159 9F		257 175 AF		277 191 BF		317 207 CF		337 223 DF		357 239 EF		377 255 FF

ECMA−94 Latin 1 European Extended Set: Multinational
P−Series Emulation (80−9F=Control Codes)

KEY

BITS B7 B6 B5 / B4 B3 B2 B1	0 0 1	
1 0 1 1	ESC	33 (OCTAL) 27 (DECIMAL) 1B (HEX)

CHARACTER

* IF ENABLED

B8*		1		1		1		1		1		1		1		1	
BITS B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
B4 B3 B2 B1	ROW	COLUMN 8		9		10		11		12		13		14		15	
0 0 0 0	0	NUL	200 128 80	DLE	220 144 90		240 160 A0	°	260 176 B0	À	300 192 C0	Ð	320 208 D0	à	340 224 E0	đ	360 240 F0
0 0 0 1	1	SOH	201 129 81	DC1 (XON)	221 145 91	¡	241 161 A1	±	261 177 B1	Á	301 193 C1	Ñ	321 209 D1	á	341 225 E1	ñ	361 241 F1
0 0 1 0	2	STX	202 130 82	DC2	222 146 92	,	242 162 A2	2	262 178 B2	Â	302 194 C2	Ò	322 210 D2	â	342 226 E2	ò	362 242 F2
0 0 1 1	3	ETX	203 131 83	DC3 (XOFF)	223 147 93	£	243 163 A3	3	263 179 B3	Ã	303 195 C3	Ó	323 211 D3	ã	343 227 E3	ó	363 243 F3
0 1 0 0	4	EOT	204 132 84	DC4	224 148 94	¤	244 164 A4	′	264 180 B4	Ä	304 196 C4	Ô	324 212 D4	ä	344 228 E4	ô	364 244 F4
0 1 0 1	5	ENQ	205 133 85	NAK	225 149 95	¥	245 165 A5	µ	265 181 B5	Å	305 197 C5	Õ	325 213 D5	å	345 229 E5	õ	365 245 F5
0 1 1 0	6	ACK	206 134 86	SYN	226 150 96	¦	246 166 A6	¶	266 182 B6	Æ	306 198 C6	Ö	326 214 D6	æ	346 230 E6	ö	366 246 F6
0 1 1 1	7	BEL	207 135 87	ETB	227 151 97	§	247 167 A7	·	267 183 B7	Ç	307 199 C7	×	327 215 D7	ç	347 231 E7	÷	367 247 F7
1 0 0 0	8	BS	210 136 88	CAN	230 152 98	¨	250 168 A8	¸	270 184 B8	È	310 200 C8	Ø	330 216 D8	è	350 232 E8	ø	370 248 F8
1 0 0 1	9	HT	211 137 89	EM	231 153 99	¿	251 169 A9	1	271 185 B9	É	311 201 C9	Ù	331 217 D9	é	351 233 E9	ù	371 249 F9
1 0 1 0	10	LF	212 138 8A	SUB	232 154 9A	a	252 170 AA	o	272 186 BA	Ê	312 202 CA	Ú	332 218 DA	ê	352 234 EA	ú	372 250 FA
1 0 1 1	11	VT	213 139 8B	ESC	233 155 9B	<<	253 171 AB	>>	273 187 BB	Ë	313 203 CB	Û	333 219 DB	ë	353 235 EB	û	373 251 FB
1 1 0 0	12	FF	214 140 8C	FS	234 156 9C	¬	254 172 AC	¿	274 188 BC	Ì	314 204 CC	Ü	334 220 DC	ì	354 236 EC	ü	374 252 FC
1 1 0 1	13	CR	215 141 8D	GS	235 157 9D	ÿ	255 173 AD	¿	275 189 BD	Í	315 205 CD	Ý	335 221 DD	í	355 237 ED	ý	375 253 FD
1 1 1 0	14	SO	216 142 8E	RS	236 158 9E	®	256 174 AE	¾	276 190 BE	Î	316 206 CE	¿	336 222 DE	î	356 238 EE	¿	376 254 FE
1 1 1 1	15	SI	217 143 8F	US	237 159 9F	—	257 175 AF	¿	277 191 BF	Ï	317 207 CF	β	337 223 DF	ï	357 239 EF		377 255 FF

ECMA−94 Latin 1 European Extended Set: Greek
P−Series Emulation (80−9F=Control Codes)

KEY

B7 B6 B5 BITS B4 B3 B2 B1	0 0 1	
1 0 1 1	ESC	33 27 1B

33 → OCTAL; 27 → DECIMAL; 1B → HEX; ESC → CHARACTER

* IF ENABLED

B8*		1		1		1		1		1		1		1		1	
BITS B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
B4 B3 B2 B1	ROW	COLUMN 8		9		10		11		12		13		14		15	
0 0 0 0	0	NUL	200 128 80	DLE	220 144 90		240 160 A0	ϊ	260 176 B0	K	300 192 C0	β	320 208 D0	σ	340 224 E0		360 240 F0
0 0 0 1	1	SOH	201 129 81	DC1 (XON)	221 145 91	Ά	241 161 A1	ΐ	261 177 B1	Λ	301 193 C1	γ	321 209 D1	ς	341 225 E1		361 241 F1
0 0 1 0	2	STX	202 130 82	DC2	222 146 92	Έ	242 162 A2	ό	262 178 B2	M	302 194 C2	δ	322 210 D2	τ	342 226 E2		362 242 F2
0 0 1 1	3	ETX	203 131 83	DC3 (XOFF)	223 147 93	Ή	243 163 A3	ύ	263 179 B3	N	303 195 C3	ε	323 211 D3	υ	343 227 E3		363 243 F3
0 1 0 0	4	EOT	204 132 84	DC4	224 148 94	Ί	244 164 A4	ϋ	264 180 B4	Ξ	304 196 C4	ζ	324 212 D4	φ	344 228 E4		364 244 F4
0 1 0 1	5	ENQ	205 133 85	NAK	225 149 95	Ϊ	245 165 A5	ΰ	265 181 B5	O	305 197 C5	η	325 213 D5	χ	345 229 E5		365 245 F5
0 1 1 0	6	ACK	206 134 86	SYN	226 150 96	Ϊ́	246 166 A6	ώ	266 182 B6	Π	306 198 C6	ϑ	326 214 D6	ψ	346 230 E6		366 246 F6
0 1 1 1	7	BEL	207 135 87	ETB	227 151 97	Ό	247 167 A7	A	267 183 B7	P	307 199 C7	ι	327 215 D7	ω	347 231 E7		367 247 F7
1 0 0 0	8	BS	210 136 88	CAN	230 152 98	Ύ	250 168 A8	B	270 184 B8	Σ	310 200 C8	κ	330 216 D8		350 232 E8		370 248 F8
1 0 0 1	9	HT	211 137 89	EM	231 153 99	Ϋ	251 169 A9	Γ	271 185 B9	T	311 201 C9	λ	331 217 D9		351 233 E9		371 249 F9
1 0 1 0	10	LF	212 138 8A	SUB	232 154 9A	Ϋ́	252 170 AA	Δ	272 186 BA	Τ	312 202 CA	μ	332 218 DA		352 234 EA		372 250 FA
1 0 1 1	11	VT	213 139 8B	ESC	233 155 9B	Ώ	253 171 AB	E	273 187 BB	Φ	313 203 CB	ν	333 219 DB		353 235 EB		373 251 FB
1 1 0 0	12	FF	214 140 8C	FS	234 156 9C	ά	254 172 AC	Z	274 188 BC	X	314 204 CC	ξ	334 220 DC		354 236 EC		374 252 FC
1 1 0 1	13	CR	215 141 8D	GS	235 157 9D	έ	255 173 AD	H	275 189 BD	Ψ	315 205 CD	ο	335 221 DD		355 237 ED		375 253 FD
1 1 1 0	14	SO	216 142 8E	RS	236 158 9E	ή	256 174 AE	Θ	276 190 BE	Ω	316 206 CE	π	336 222 DE		356 238 EE		376 254 FE
1 1 1 1	15	SI	217 143 8F	US	237 159 9F	ί	257 175 AF	I	277 191 BF	α	317 207 CF	ρ	337 223 DF		357 239 EF		377 255 FF

ECMA−94 Latin 1 European Extended Set: Graphics
P−Series Emulation (80−9F=Control Codes)

KEY

BITS B7 B6 B5 / B4 B3 B2 B1	0 0 1
1 0 1 1	ESC — 33 (OCTAL), 27 (DECIMAL), 1B (HEX); ESC = CHARACTER

* IF ENABLED

B8*		1		1		1		1		1		1		1		1	
BITS B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
B4 B3 B2 B1	ROW	COLUMN 8		9		10		11		12		13		14		15	
0 0 0 0	0	NUL	200 128 80	DLE	220 144 90		240 160 A0	2/5	260 176 B0	┘	300 192 C0	╝	320 208 D0	△	340 224 E0		360 240 F0
0 0 0 1	1	SOH	201 129 81	DC1 (XON)	221 145 91		241 161 A1	3/5	261 177 B1	┐	301 193 C1	╗	321 209 D1	▽	341 225 E1		361 241 F1
0 0 1 0	2	STX	202 130 82	DC2	222 146 92		242 162 A2	4/5	262 178 B2	┌	302 194 C2	╔	322 210 D2	▷	342 226 E2		362 242 F2
0 0 1 1	3	ETX	203 131 83	DC3 (XOFF)	223 147 93		243 163 A3	✓	263 179 B3	├	303 195 C3	╟	323 211 D3	◁	343 227 E3		363 243 F3
0 1 0 0	4	EOT	204 132 84	DC4	224 148 94	-	244 164 A4	♂	264 180 B4	┴	304 196 C4	╩	324 212 D4	▭	344 228 E4		364 244 F4
0 1 0 1	5	ENQ	205 133 85	NAK	225 149 95	–	245 165 A5	♀	265 181 B5	┤	305 197 C5	╣	325 213 D5	☆	345 229 E5		365 245 F5
0 1 1 0	6	ACK	206 134 86	SYN	226 150 96	—	246 166 A6	Ъ	266 182 B6	┬	306 198 C6	╦	326 214 D6	✱	346 230 E6		366 246 F6
0 1 1 1	7	BEL	207 135 87	ETB	227 151 97	―	247 167 A7	„	267 183 B7	┼	307 199 C7	╬	327 215 D7	⌖	347 231 E7		367 247 F7
1 0 0 0	8	BS	210 136 88	CAN	230 152 98	†	250 168 A8	℗	270 184 B8	╞	310 200 C8	╠	330 216 D8	└	350 232 E8		370 248 F8
1 0 0 1	9	HT	211 137 89	EM	231 153 99	‡	251 169 A9	♣	271 185 B9	╨	311 201 C9	╧	331 217 D9	┘	351 233 E9		371 249 F9
1 0 1 0	10	LF	212 138 8A	SUB	232 154 9A	✠	252 170 AA	◇	272 186 BA	╕	312 202 CA	╢	332 218 DA	┌	352 234 EA		372 250 FA
1 0 1 1	11	VT	213 139 8B	ESC	233 155 9B	¦	253 171 AB	♡	273 187 BB	╥	313 203 CB	╤	333 219 DB	┐	353 235 EB		373 251 FB
1 1 0 0	12	FF	214 140 8C	FS	234 156 9C	…	254 172 AC	♠	274 188 BC	╪	314 204 CC	╫	334 220 DC		354 236 EC		374 252 FC
1 1 0 1	13	CR	215 141 8D	GS	235 157 9D	1/3	255 173 AD	─	275 189 BD	═	315 205 CD	⌑	335 221 DD		355 237 ED		375 253 FD
1 1 1 0	14	SO	216 142 8E	RS	236 158 9E	2/3	256 174 AE	│	276 190 BE	║	316 206 CE	⬡	336 222 DE		356 238 EE		376 254 FE
1 1 1 1	15	SI	217 143 8F	US	237 159 9F	1/5	257 175 AF	└	277 191 BF	╚	317 207 CF	□	337 223 DF		357 239 EF		377 255 FF

ECMA−94 Latin 1 European Extended Set: Scientific
P−Series Emulation (80−9F=Control Codes)

KEY

BITS B7 B6 B5 / B4 B3 B2 B1	0 0 1	
1 0 1 1	ESC (CHARACTER)	33 (OCTAL) 27 (DECIMAL) 1B (HEX)

* IF ENABLED

B8*: 1 (all columns)

BITS B7 B6 B5 / B4 B3 B2 B1	ROW	Col 8 (0 0 0)		Col 9 (0 0 1)		Col 10 (0 1 0)		Col 11 (0 1 1)	
0 0 0 0	0	NUL	200 128 80	DLE	220 144 90		240 160 A0	⇔	260 176 B0
0 0 0 1	1	SOH	201 129 81	DC1 (XON)	221 145 91	≡	241 161 A1	¬	261 177 B1
0 0 1 0	2	STX	202 130 82	DC2	222 146 92	∧	242 162 A2	∀	262 178 B2
0 0 1 1	3	ETX	203 131 83	DC3 (XOFF)	223 147 93	∨	243 163 A3	∃	263 179 B3
0 1 0 0	4	EOT	204 132 84	DC4	224 148 94	∩	244 164 A4	α	264 180 B4
0 1 0 1	5	ENQ	205 133 85	NAK	225 149 95	∪	245 165 A5	β	265 181 B5
0 1 1 0	6	ACK	206 134 86	SYN	226 150 96	⊂	246 166 A6	γ	266 182 B6
0 1 1 1	7	BEL	207 135 87	ETB	227 151 97	⊃	247 167 A7	Γ	267 183 B7
1 0 0 0	8	BS	210 136 88	CAN	230 152 98	⇐	250 168 A8	δ	270 184 B8
1 0 0 1	9	HT	211 137 89	EM	231 153 99	⇒	251 169 A9	Δ	271 185 B9
1 0 1 0	10	LF	212 138 8A	SUB	232 154 9A	∴	252 170 AA	ε	272 186 BA
1 0 1 1	11	VT	213 139 8B	ESC	233 155 9B	∵	253 171 AB	ζ	273 187 BB
1 1 0 0	12	FF	214 140 8C	FS	234 156 9C	∈	254 172 AC	η	274 188 BC
1 1 0 1	13	CR	215 141 8D	GS	235 157 9D	∋	255 173 AD	Θ	275 189 BD
1 1 1 0	14	SO	216 142 8E	RS	236 158 9E	⊆	256 174 AE	θ	276 190 BE
1 1 1 1	15	SI	217 143 8F	US	237 159 9F	⊇	257 175 AF	ι	277 191 BF

BITS B7 B6 B5 / B4 B3 B2 B1	ROW	Col 12 (1 0 0)		Col 13 (1 0 1)		Col 14 (1 1 0)		Col 15 (1 1 1)	
0 0 0 0	0	ϰ	300 192 C0	χ	320 208 D0	√	340 224 E0		360 240 F0
0 0 0 1	1	λ	301 193 C1	ψ	321 209 D1	ƒ	341 225 E1		361 241 F1
0 0 1 0	2	Λ	302 194 C2	Ψ	322 210 D2	∝	342 226 E2		362 242 F2
0 0 1 1	3	ν	303 195 C3	ω	323 211 D3	1⁄11	343 227 E3		363 243 F3
0 1 0 0	4	ξ	304 196 C4	∫	324 212 D4	χ	344 228 E4		364 244 F4
0 1 0 1	5	Ξ	305 197 C5	∮	325 213 D5	□	345 229 E5		365 245 F5
0 1 1 0	6	π	306 198 C6	∞	326 214 D6	‖	346 230 E6		366 246 F6
0 1 1 1	7	Π	307 199 C7	∇	327 215 D7	⊥	347 231 E7		367 247 F7
1 0 0 0	8	ϱ	310 200 C8	∂	330 216 D8	♃	350 232 E8		370 248 F8
1 0 0 1	9	σ	311 201 C9	~	331 217 D9	∟	351 233 E9		371 249 F9
1 0 1 0	10	Σ	312 202 CA	≈	332 218 DA	<	352 234 EA		372 250 FA
1 0 1 1	11	τ	313 203 CB	≃	333 219 DB	>	353 235 EB		373 251 FB
1 1 0 0	12	υ	314 204 CC	≅	334 220 DC	′	354 236 EC		374 252 FC
1 1 0 1	13	Υ	315 205 CD	≤	335 221 DD	″	355 237 ED		375 253 FD
1 1 1 0	14	φ	316 206 CE	≠	336 222 DE	∓	356 238 EE		376 254 FE
1 1 1 1	15	Φ	317 207 CF	≥	337 223 DF		357 239 EF		377 255 FF

ECMA−94 Latin 1 Primary Character Set
P−Series Emulation (80−9F=Printable Symbols)

See the ECMA 94 Latin 1 International Languages Substitution Table for the International Language selected.

NOTE: In the OCR−A print mode with ASCII International Language selected, the characters at addresses 5F, 60 and 7E will be replaced by the Fork, Chair, and Hook, respectively.

* IF ENABLED

BITS B4 B3 B2 B1	ROW	COLUMN 0		1		2		3		4		5		6		7	
B8*		0		0		0		0		0		0		0		0	
B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
0 0 0 0	0	NUL	0 0 0	DLE	20 16 10		40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1	SOH	1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2	STX	2 2 2	DC2	22 18 12	″	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3	ETX	3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4	EOT	4 4 4	DC4	24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	ENQ	5 5 5	NAK	25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6	ACK	6 6 6	SYN	26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7	ETB	27 23 17	′	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9	EM	31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 0 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 0 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 0 C	FS	34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	|	174 124 7C
1 1 0 1	13	CR	15 13 0 D	GS	35 29 1D	–	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 0 E	RS	36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 0 F	US	37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F		177 127 7F

ECMA−94 Latin 1 European Extended Set: Barcode
P−Series Emulation (80−9F=Printable Symbols)

KEY

BITS B7 B6 B5 / B4 B3 B2 B1	0 0 1
1 0 1 1	ESC 33 (OCTAL) 27 (DECIMAL) 1B (HEX) — CHARACTER

* IF ENABLED

B8*		1	1	1	1	1	1	1	1
BITS B7 B6 B5		0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1
B4 B3 B2 B1	ROW	COLUMN 8	9	10	11	12	13	14	15
0 0 0 0	0	200 128 80	220 144 90	240 160 A0	260 176 B0	300 192 C0	320 208 D0	340 224 E0	360 240 F0
0 0 0 1	1	201 129 81	221 145 91	241 161 A1	261 177 B1	301 193 C1	321 209 D1	341 225 E1	361 241 F1
0 0 1 0	2	202 130 82	222 146 92	242 162 A2	262 178 B2	302 194 C2	322 210 D2	342 226 E2	362 242 F2
0 0 1 1	3	203 131 83	223 147 93	243 163 A3	263 179 B3	303 195 C3	323 211 D3	343 227 E3	363 243 F3
0 1 0 0	4	204 132 84	224 148 94	244 164 A4	264 180 B4	304 196 C4	324 212 D4	344 228 E4	364 244 F4
0 1 0 1	5	205 133 85	225 149 95	245 165 A5	265 181 B5	305 197 C5	325 213 D5	345 229 E5	365 245 F5
0 1 1 0	6	206 134 86	226 150 96	246 166 A6	266 182 B6	306 198 C6	326 214 D6	346 230 E6	366 246 F6
0 1 1 1	7	207 135 87	227 151 97	247 167 A7	267 183 B7	307 199 C7	327 215 D7	347 231 E7	367 247 F7
1 0 0 0	8	210 136 88	230 152 98	250 168 A8	270 184 B8	310 200 C8	330 216 D8	350 232 E8	370 248 F8
1 0 0 1	9	211 137 89	231 153 99	251 169 A9	271 185 B9	311 201 C9	331 217 D9	351 233 E9	371 249 F9
1 0 1 0	10	212 138 8A	232 154 9A	252 170 AA	272 186 BA	312 202 CA	332 218 DA	352 234 EA	372 250 FA
1 0 1 1	11	213 139 8B	233 155 9B	253 171 AB	273 187 BB	313 203 CB	333 219 DB	353 235 EB	373 251 FB
1 1 0 0	12	214 140 8C	234 156 9C	254 172 AC	274 188 BC	314 204 CC	334 220 DC	354 236 EC	374 252 FC
1 1 0 1	13	215 141 8D	235 157 9D	255 173 AD	275 189 BD	315 205 CD	335 221 DD	355 237 ED	375 253 FD
1 1 1 0	14	216 142 8E	236 158 9E	256 174 AE	276 190 BE	316 206 CE	336 222 DE	356 238 EE	376 254 FE
1 1 1 1	15	217 143 8F	237 159 9F	257 175 AF	277 191 BF	317 207 CF	337 223 DF	357 239 EF	377 255 FF

ECMA−94 Latin 1 European Extended Set: Multinational
P−Series Emulation (80−9F=Printable Symbols)

KEY

BITS B7 B6 B5 / B4 B3 B2 B1	0 0 1	
1 0 1 1	ESC	33 (OCTAL) 27 (DECIMAL) 1B (HEX)

CHARACTER

* IF ENABLED

B8*		1		1		1		1		1		1		1		1	
BITS B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
B4 B3 B2 B1	ROW	COLUMN 8		9		10		11		12		13		14		15	
0 0 0 0	0	¿	200 128 80	‾∗	220 144 90		240 160 A0	°	260 176 B0	À	300 192 C0	Đ	320 208 D0	à	340 224 E0	đ	360 240 F0
0 0 0 1	1	¿	201 129 81	█	221 145 91	¡	241 161 A1	±	261 177 B1	Á	301 193 C1	Ñ	321 209 D1	á	341 225 E1	ñ	361 241 F1
0 0 1 0	2	₧	202 130 82		222 146 92	‚	242 162 A2	2	262 178 B2	Â	302 194 C2	Ò	322 210 D2	â	342 226 E2	ò	362 242 F2
0 0 1 1	3	|	203 131 83		223 147 93	£	243 163 A3	3	263 179 B3	Ã	303 195 C3	Ó	323 211 D3	ã	343 227 E3	ó	363 243 F3
0 1 0 0	4	ℼ	204 132 84		224 148 94	¤	244 164 A4	′	264 180 B4	Ä	304 196 C4	Ô	324 212 D4	ä	344 228 E4	ô	364 244 F4
0 1 0 1	5	ı	205 133 85		225 149 95	¥	245 165 A5	µ	265 181 B5	Å	305 197 C5	Õ	325 213 D5	å	345 229 E5	õ	365 245 F5
0 1 1 0	6	Ğ	206 134 86		226 150 96	¦	246 166 A6	¶	266 182 B6	Æ	306 198 C6	Ö	326 214 D6	æ	346 230 E6	ö	366 246 F6
0 1 1 1	7	ğ	207 135 87		227 151 97	§	247 167 A7	·	267 183 B7	Ç	307 199 C7	×	327 215 D7	ç	347 231 E7	÷	367 247 F7
1 0 0 0	8	Ş	210 136 88		230 152 98	¨	250 168 A8	¸	270 184 B8	È	310 200 C8	Ø	330 216 D8	è	350 232 E8	ø	370 248 F8
1 0 0 1	9	ş	211 137 89		231 153 99	¿	251 169 A9	1	271 185 B9	É	311 201 C9	Ù	331 217 D9	é	351 233 E9	ù	371 249 F9
1 0 1 0	10	İ	212 138 8A		232 154 9A	a	252 170 AA	o	272 186 BA	Ê	312 202 CA	Ú	332 218 DA	ê	352 234 EA	ú	372 250 FA
1 0 1 1	11	¨	213 139 8B		233 155 9B	<<	253 171 AB	>>	273 187 BB	Ë	313 203 CB	Û	333 219 DB	ë	353 235 EB	û	373 251 FB
1 1 0 0	12	ˇ	214 140 8C		234 156 9C	¬	254 172 AC	¿	274 188 BC	Ì	314 204 CC	Ü	334 220 DC	ì	354 236 EC	ü	374 252 FC
1 1 0 1	13	ƒ	215 141 8D		235 157 9D	ÿ	255 173 AD	¿	275 189 BD	Í	315 205 CD	Ý	335 221 DD	í	355 237 ED	ý	375 253 FD
1 1 1 0	14	═	216 142 8E		236 158 9E	®	256 174 AE	¾	276 190 BE	Î	316 206 CE	¿	336 222 DE	î	356 238 EE	¿	376 254 FE
1 1 1 1	15	⁻;	217 143 8F		237 159 9F	—	257 175 AF	¿	277 191 BF	Ï	317 207 CF	β	337 223 DF	ï	357 239 EF		377 255 FF

ECMA−94 Latin 1 European Extended Set: Greek
P−Series Emulation (80−9F=Printable Symbols)

KEY

BITS: B7 B6 B5 / B4 B3 B2 B1	0 0 1	
1 0 1 1	ESC	33 → OCTAL 27 → DECIMAL 1B → HEX

ESC → CHARACTER

* IF ENABLED

B8*		1		1		1		1		1		1		1		1	
BITS B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
B4 B3 B2 B1	ROW	COLUMN 8		9		10		11		12		13		14		15	
0 0 0 0	0		200 128 80		220 144 90		240 160 A0	ΐ	260 176 B0	Κ	300 192 C0	β	320 208 D0	σ	340 224 E0		360 240 F0
0 0 0 1	1		201 129 81		221 145 91	Ά	241 161 A1	ϊ	261 177 B1	Λ	301 193 C1	γ	321 209 D1	ς	341 225 E1		361 241 F1
0 0 1 0	2		202 130 82		222 146 92	Έ	242 162 A2	ό	262 178 B2	Μ	302 194 C2	δ	322 210 D2	τ	342 226 E2		362 242 F2
0 0 1 1	3		203 131 83		223 147 93	Ή	243 163 A3	ύ	263 179 B3	Ν	303 195 C3	ε	323 211 D3	υ	343 227 E3		363 243 F3
0 1 0 0	4		204 132 84		224 148 94	Ί	244 164 A4	ϋ	264 180 B4	Ξ	304 196 C4	ζ	324 212 D4	φ	344 228 E4		364 244 F4
0 1 0 1	5		205 133 85		225 149 95	Ϊ	245 165 A5	ΰ	265 181 B5	Ο	305 197 C5	η	325 213 D5	χ	345 229 E5		365 245 F5
0 1 1 0	6		206 134 86		226 150 96	Ϊ́	246 166 A6	ώ	266 182 B6	Π	306 198 C6	ϑ	326 214 D6	ψ	346 230 E6		366 246 F6
0 1 1 1	7		207 135 87		227 151 97	Ό	247 167 A7	Α	267 183 B7	Ρ	307 199 C7	ι	327 215 D7	ω	347 231 E7		367 247 F7
1 0 0 0	8		210 136 88		230 152 98	Ύ	250 168 A8	Β	270 184 B8	Σ	310 200 C8	κ	330 216 D8		350 232 E8		370 248 F8
1 0 0 1	9		211 137 89		231 153 99	Ϋ	251 169 A9	Γ	271 185 B9	Τ	311 201 C9	λ	331 217 D9		351 233 E9		371 249 F9
1 0 1 0	10		212 138 8A		232 154 9A	Ϋ́	252 170 AA	Δ	272 186 BA	Τ	312 202 CA	μ	332 218 DA		352 234 EA		372 250 FA
1 0 1 1	11		213 139 8B		233 155 9B	Ώ	253 171 AB	Ε	273 187 BB	Φ	313 203 CB	ν	333 219 DB		353 235 EB		373 251 FB
1 1 0 0	12		214 140 8C		234 156 9C	ά	254 172 AC	Ζ	274 188 BC	Χ	314 204 CC	ξ	334 220 DC		354 236 EC		374 252 FC
1 1 0 1	13		215 141 8D		235 157 9D	έ	255 173 AD	Η	275 189 BD	Ψ	315 205 CD	ο	335 221 DD		355 237 ED		375 253 FD
1 1 1 0	14		216 142 8E		236 158 9E	ή	256 174 AE	Θ	276 190 BE	Ω	316 206 CE	π	336 222 DE		356 238 EE		376 254 FE
1 1 1 1	15		217 143 8F		237 159 9F	ί	257 175 AF	Ι	277 191 BF	α	317 207 CF	ρ	337 223 DF		357 239 EF		377 255 FF

ECMA−94 Latin 1 European Extended Set: Graphics
P−Series Emulation (80−9F=Printable Symbols)

KEY

B7 B6 B5 BITS B4 B3 B2 B1	0 0 1
1 0 1 1	ESC 33 27 1B

33 ← OCTAL
27 ← DECIMAL
1B ← HEX
ESC ↑ CHARACTER

* IF ENABLED

B8*		1	1	1	1	1	1	1	1
B7 B6 B5 BITS		0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1
B4 B3 B2 B1	ROW	COLUMN 8	9	10	11	12	13	14	15
0 0 0 0	0	200 128 80	220 144 90	240 160 A0	2/5 260 176 B0	┘ 300 192 C0	╝ 320 208 D0	△ 340 224 E0	360 240 F0
0 0 0 1	1	201 129 81	221 145 91	241 161 A1	3/5 261 177 B1	┐ 301 193 C1	╗ 321 209 D1	▽ 341 225 E1	361 241 F1
0 0 1 0	2	202 130 82	222 146 92	242 162 A2	4/5 262 178 B2	┌ 302 194 C2	╔ 322 210 D2	▷ 342 226 E2	362 242 F2
0 0 1 1	3	203 131 83	223 147 93	243 163 A3	✓ 263 179 B3	├ 303 195 C3	╠ 323 211 D3	◁ 343 227 E3	363 243 F3
0 1 0 0	4	204 132 84	224 148 94	- 244 164 A4	♂ 264 180 B4	┴ 304 196 C4	╩ 324 212 D4	▭ 344 228 E4	364 244 F4
0 1 0 1	5	205 133 85	225 149 95	– 245 165 A5	♀ 265 181 B5	┤ 305 197 C5	╣ 325 213 D5	✩ 345 229 E5	365 245 F5
0 1 1 0	6	206 134 86	226 150 96	– 246 166 A6	ƀ 266 182 B6	┬ 306 198 C6	╦ 326 214 D6	✱ 346 230 E6	366 246 F6
0 1 1 1	7	207 135 87	227 151 97	— 247 167 A7	„ 267 183 B7	┼ 307 199 C7	╬ 327 215 D7	⌖ 347 231 E7	367 247 F7
1 0 0 0	8	210 136 88	230 152 98	† 250 168 A8	℗ 270 184 B8	╞ 310 200 C8	╟ 330 216 D8	└ 350 232 E8	370 248 F8
1 0 0 1	9	211 137 89	231 153 99	‡ 251 169 A9	♣ 271 185 B9	╨ 311 201 C9	╧ 331 217 D9	┘ 351 233 E9	371 249 F9
1 0 1 0	10	212 138 8A	232 154 9A	✠ 252 170 AA	◇ 272 186 BA	╕ 312 202 CA	╢ 332 218 DA	┌ 352 234 EA	372 250 FA
1 0 1 1	11	213 139 8B	233 155 9B	¦ 253 171 AB	♡ 273 187 BB	╥ 313 203 CB	╤ 333 219 DB	┐ 353 235 EB	373 251 FB
1 1 0 0	12	214 140 8C	234 156 9C	… 254 172 AC	♠ 274 188 BC	╪ 314 204 CC	╫ 334 220 DC	354 236 EC	374 252 FC
1 1 0 1	13	215 141 8D	235 157 9D	1/3 255 173 AD	─ 275 189 BD	═ 315 205 CD	⌑ 335 221 DD	355 237 ED	375 253 FD
1 1 1 0	14	216 142 8E	236 158 9E	2/3 256 174 AE	│ 276 190 BE	║ 316 206 CE	⬡ 336 222 DE	356 238 EE	376 254 FE
1 1 1 1	15	217 143 8F	237 159 9F	1/5 257 175 AF	└ 277 191 BF	╚ 317 207 CF	□ 337 223 DF	357 239 EF	377 255 FF

ECMA−94 Latin 1 European Extended Set: Scientific
P−Series Emulation (80−9F=Printable Symbols)

KEY

BITS B7 B6 B5 / B4 B3 B2 B1	0 0 1	
1 0 1 1	ESC (CHARACTER)	33 (OCTAL) 27 (DECIMAL) 1B (HEX)

* IF ENABLED

B8*		1		1		1		1		1		1		1		1	
BITS B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
B4 B3 B2 B1	ROW	COLUMN 8		9		10		11		12		13		14		15	
0 0 0 0	0		200 128 80		220 144 90		240 160 A0	⇔	260 176 B0	ϰ	300 192 C0	χ	320 208 D0	√	340 224 E0		360 240 F0
0 0 0 1	1		201 129 81		221 145 91	≡	241 161 A1	¬	261 177 B1	λ	301 193 C1	ψ	321 209 D1	ƒ	341 225 E1		361 241 F1
0 0 1 0	2		202 130 82		222 146 92	⋀	242 162 A2	∀	262 178 B2	Λ	302 194 C2	Ψ	322 210 D2	∝	342 226 E2		362 242 F2
0 0 1 1	3		203 131 83		223 147 93	⋁	243 163 A3	∃	263 179 B3	ν	303 195 C3	ω	323 211 D3	1/11	343 227 E3		363 243 F3
0 1 0 0	4		204 132 84		224 148 94	∩	244 164 A4	α	264 180 B4	ξ	304 196 C4	∫	324 212 D4	χ	344 228 E4		364 244 F4
0 1 0 1	5		205 133 85		225 149 95	∪	245 165 A5	β	265 181 B5	Ξ	305 197 C5	∮	325 213 D5	□	345 229 E5		365 245 F5
0 1 1 0	6		206 134 86		226 150 96	⊂	246 166 A6	γ	266 182 B6	π	306 198 C6	∞	326 214 D6	‖	346 230 E6		366 246 F6
0 1 1 1	7		207 135 87		227 151 97	⊃	247 167 A7	Γ	267 183 B7	Π	307 199 C7	∇	327 215 D7	⊥	347 231 E7		367 247 F7
1 0 0 0	8		210 136 88		230 152 98	⇐	250 168 A8	δ	270 184 B8	ϱ	310 200 C8	∂	330 216 D8	♃	350 232 E8		370 248 F8
1 0 0 1	9		211 137 89		231 153 99	⇒	251 169 A9	Δ	271 185 B9	σ	311 201 C9	~	331 217 D9	L	351 233 E9		371 249 F9
1 0 1 0	10		212 138 8A		232 154 9A	∴	252 170 AA	ε	272 186 BA	Σ	312 202 CA	≈	332 218 DA	<	352 234 EA		372 250 FA
1 0 1 1	11		213 139 8B		233 155 9B	∵	253 171 AB	ζ	273 187 BB	τ	313 203 CB	≃	333 219 DB	>	353 235 EB		373 251 FB
1 1 0 0	12		214 140 8C		234 156 9C	∈	254 172 AC	η	274 188 BC	υ	314 204 CC	≅	334 220 DC	′	354 236 EC		374 252 FC
1 1 0 1	13		215 141 8D		235 157 9D	∋	255 173 AD	Θ	275 189 BD	Υ	315 205 CD	≤	335 221 DD	″	355 237 ED		375 253 FD
1 1 1 0	14		216 142 8E		236 158 9E	⊆	256 174 AE	ϑ	276 190 BE	ø	316 206 CE	≠	336 222 DE	∓	356 238 EE		376 254 FE
1 1 1 1	15		217 143 8F		237 159 9F	⊇	257 175 AF	ι	277 191 BF	Φ	317 207 CF	≥	337 223 DF		357 239 EF		377 255 FF

ECMA−94 Latin 1 Primary Character Set
Serial Matrix Emulation (80−9F=Control Codes)

See the ECMA 94 Latin 1 International Languages Substitution Table for the International Language selected.

NOTE: In the OCR−A print mode with ASCII International Language selected, the characters at addresses 5F, 60 and 7E will be replaced by the Fork, Chair, and Hook, respectively.

* IF ENABLED

B8*		0		0		0		0		0		0		0		0	
BITS B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
B4 B3 B2 B1	ROW	COLUMN 0		1		2		3		4		5		6		7	
0 0 0 0	0	NUL	0 0 0	DLE	20 16 10		40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1	SOH	1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2	STX	2 2 2	DC2	22 18 12	"	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3	ETX	3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4	EOT	4 4 4	DC4	24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	ENQ	5 5 5	NAK	25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6	ACK	6 6 6	SYN	26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7	ETB	27 23 17	'	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9	EM	31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 0 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 0 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 0 C	FS	34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	|	174 124 7C
1 1 0 1	13	CR	15 13 0 D	GS	35 29 1D	–	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 0 E	RS	36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 0 F	US	37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F	DEL	177 127 7F

ECMA−94 Latin 1 European Extended Set: Barcode Serial Matrix Emulation (80−9F=Control Codes)

KEY

BITS B7 B6 B5 / B4 B3 B2 B1	0 0 1	
1 0 1 1	ESC (CHARACTER)	33 (OCTAL) 27 (DECIMAL) 1B (HEX)

* IF ENABLED

BITS B8*		1		1		1		1		1		1		1		1	
B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
B4 B3 B2 B1	ROW	COLUMN 8		9		10		11		12		13		14		15	
0 0 0 0	0	NUL	200 128 80	DLE	220 144 90		240 160 A0		260 176 B0		300 192 C0		320 208 D0		340 224 E0		360 240 F0
0 0 0 1	1	SOH	201 129 81	DC1 (XON)	221 145 91		241 161 A1		261 177 B1		301 193 C1		321 209 D1		341 225 E1		361 241 F1
0 0 1 0	2	STX	202 130 82	DC2	222 146 92		242 162 A2		262 178 B2		302 194 C2		322 210 D2		342 226 E2		362 242 F2
0 0 1 1	3	ETX	203 131 83	DC3 (XOFF)	223 147 93		243 163 A3		263 179 B3		303 195 C3		323 211 D3		343 227 E3		363 243 F3
0 1 0 0	4	EOT	204 132 84	DC4	224 148 94		244 164 A4		264 180 B4		304 196 C4		324 212 D4		344 228 E4		364 244 F4
0 1 0 1	5	ENQ	205 133 85	NAK	225 149 95		245 165 A5		265 181 B5		305 197 C5		325 213 D5		345 229 E5		365 245 F5
0 1 1 0	6	ACK	206 134 86	SYN	226 150 96		246 166 A6		266 182 B6		306 198 C6		326 214 D6		346 230 E6		366 246 F6
0 1 1 1	7	BEL	207 135 87	ETB	227 151 97		247 167 A7		267 183 B7		307 199 C7		327 215 D7		347 231 E7		367 247 F7
1 0 0 0	8	BS	210 136 88	CAN	230 152 98		250 168 A8		270 184 B8		310 200 C8		330 216 D8		350 232 E8		370 248 F8
1 0 0 1	9	HT	211 137 89	EM	231 153 99		251 169 A9		271 185 B9		311 201 C9		331 217 D9		351 233 E9		371 249 F9
1 0 1 0	10	LF	212 138 8A	SUB	232 154 9A		252 170 AA		272 186 BA		312 202 CA		332 218 DA		352 234 EA		372 250 FA
1 0 1 1	11	VT	213 139 8B	ESC	233 155 9B		253 171 AB		273 187 BB		313 203 CB		333 219 DB		353 235 EB		373 251 FB
1 1 0 0	12	FF	214 140 8C	FS	234 156 9C		254 172 AC		274 188 BC		314 204 CC		334 220 DC		354 236 EC		374 252 FC
1 1 0 1	13	CR	215 141 8D	GS	235 157 9D		255 173 AD		275 189 BD		315 205 CD		335 221 DD		355 237 ED		375 253 FD
1 1 1 0	14	SO	216 142 8E	RS	236 158 9E		256 174 AE		276 190 BE		316 206 CE		336 222 DE		356 238 EE		376 254 FE
1 1 1 1	15	SI	217 143 8F	US	237 159 9F		257 175 AF		277 191 BF		317 207 CF		337 223 DF		357 239 EF		377 255 FF

ECMA−94 Latin 1 European Extended Set: Multinational Serial Matrix Emulation (80−9F=Control Codes)

KEY

BITS B7 B6 B5 / B4 B3 B2 B1	0 0 1	
1 0 1 1	ESC	33 (OCTAL) 27 (DECIMAL) 1B (HEX)

CHARACTER

* IF ENABLED

B8*		1		1		1		1		1		1		1		1	
BITS B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
B4 B3 B2 B1	ROW	COLUMN 8		9		10		11		12		13		14		15	
0 0 0 0	0	NUL	200 128 80	DLE	220 144 90		240 160 A0	°	260 176 B0	À	300 192 C0	Ð	320 208 D0	à	340 224 E0	đ	360 240 F0
0 0 0 1	1	SOH	201 129 81	DC1 (XON)	221 145 91	¡	241 161 A1	±	261 177 B1	Á	301 193 C1	Ñ	321 209 D1	á	341 225 E1	ñ	361 241 F1
0 0 1 0	2	STX	202 130 82	DC2	222 146 92	‚	242 162 A2	2	262 178 B2	Â	302 194 C2	Ò	322 210 D2	â	342 226 E2	ò	362 242 F2
0 0 1 1	3	ETX	203 131 83	DC3 (XOFF)	223 147 93	£	243 163 A3	3	263 179 B3	Ã	303 195 C3	Ó	323 211 D3	ã	343 227 E3	ó	363 243 F3
0 1 0 0	4	EOT	204 132 84	DC4	224 148 94	¤	244 164 A4	´	264 180 B4	Ä	304 196 C4	Ô	324 212 D4	ä	344 228 E4	ô	364 244 F4
0 1 0 1	5	ENQ	205 133 85	NAK	225 149 95	¥	245 165 A5	µ	265 181 B5	Å	305 197 C5	Õ	325 213 D5	å	345 229 E5	õ	365 245 F5
0 1 1 0	6	ACK	206 134 86	SYN	226 150 96	¦	246 166 A6	¶	266 182 B6	Æ	306 198 C6	Ö	326 214 D6	æ	346 230 E6	ö	366 246 F6
0 1 1 1	7	BEL	207 135 87	ETB	227 151 97	§	247 167 A7	·	267 183 B7	Ç	307 199 C7	×	327 215 D7	ç	347 231 E7	÷	367 247 F7
1 0 0 0	8	BS	210 136 88	CAN	230 152 98	¨	250 168 A8	¸	270 184 B8	È	310 200 C8	Ø	330 216 D8	è	350 232 E8	ø	370 248 F8
1 0 0 1	9	HT	211 137 89	EM	231 153 99	¿	251 169 A9	1	271 185 B9	É	311 201 C9	Ù	331 217 D9	é	351 233 E9	ù	371 249 F9
1 0 1 0	10	LF	212 138 8A	SUB	232 154 9A	a	252 170 AA	o	272 186 BA	Ê	312 202 CA	Ú	332 218 DA	ê	352 234 EA	ú	372 250 FA
1 0 1 1	11	VT	213 139 8B	ESC	233 155 9B	<<	253 171 AB	>>	273 187 BB	Ë	313 203 CB	Û	333 219 DB	ë	353 235 EB	û	373 251 FB
1 1 0 0	12	FF	214 140 8C	FS	234 156 9C	¬	254 172 AC	¿	274 188 BC	Ì	314 204 CC	Ü	334 220 DC	ì	354 236 EC	ü	374 252 FC
1 1 0 1	13	CR	215 141 8D	GS	235 157 9D	ÿ	255 173 AD	¿	275 189 BD	Í	315 205 CD	Ý	335 221 DD	í	355 237 ED	ý	375 253 FD
1 1 1 0	14	SO	216 142 8E	RS	236 158 9E	®	256 174 AE	¾	276 190 BE	Î	316 206 CE	¿	336 222 DE	î	356 238 EE	¿	376 254 FE
1 1 1 1	15	SI	217 143 8F	US	237 159 9F	—	257 175 AF	¿	277 191 BF	Ï	317 207 CF	β	337 223 DF	ï	357 239 EF		377 255 FF

ECMA−94 Latin 1 European Extended Set: Greek
Serial Matrix Emulation (80−9F=Control Codes)

KEY

BITS B7 B6 B5 / B4 B3 B2 B1	0 0 1
1 0 1 1	ESC 33 (OCTAL) 27 (DECIMAL) 1B (HEX) — CHARACTER

* IF ENABLED

B8*		1		1		1		1		1		1		1		1	
BITS B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
B4 B3 B2 B1	ROW	COLUMN 8		9		10		11		12		13		14		15	
0 0 0 0	0	NUL	200 128 80	DLE	220 144 90		240 160 A0	ϊ	260 176 B0	K	300 192 C0	β	320 208 D0	σ	340 224 E0		360 240 F0
0 0 0 1	1	SOH	201 129 81	DC1 (XON)	221 145 91	Ά	241 161 A1	ΐ	261 177 B1	Λ	301 193 C1	γ	321 209 D1	ς	341 225 E1		361 241 F1
0 0 1 0	2	STX	202 130 82	DC2	222 146 92	Έ	242 162 A2	ό	262 178 B2	M	302 194 C2	δ	322 210 D2	τ	342 226 E2		362 242 F2
0 0 1 1	3	ETX	203 131 83	DC3 (XOFF)	223 147 93	Ή	243 163 A3	ύ	263 179 B3	N	303 195 C3	ε	323 211 D3	υ	343 227 E3		363 243 F3
0 1 0 0	4	EOT	204 132 84	DC4	224 148 94	Ί	244 164 A4	ϋ	264 180 B4	Ξ	304 196 C4	ζ	324 212 D4	φ	344 228 E4		364 244 F4
0 1 0 1	5	ENQ	205 133 85	NAK	225 149 95	Ϊ	245 165 A5	ΰ	265 181 B5	O	305 197 C5	η	325 213 D5	χ	345 229 E5		365 245 F5
0 1 1 0	6	ACK	206 134 86	SYN	226 150 96	Ϊ́	246 166 A6	ώ	266 182 B6	Π	306 198 C6	ϑ	326 214 D6	ψ	346 230 E6		366 246 F6
0 1 1 1	7	BEL	207 135 87	ETB	227 151 97	Ό	247 167 A7	A	267 183 B7	P	307 199 C7	ι	327 215 D7	ω	347 231 E7		367 247 F7
1 0 0 0	8	BS	210 136 88	CAN	230 152 98	Ύ	250 168 A8	B	270 184 B8	Σ	310 200 C8	κ	330 216 D8		350 232 E8		370 248 F8
1 0 0 1	9	HT	211 137 89	EM	231 153 99	Ϋ	251 169 A9	Γ	271 185 B9	T	311 201 C9	λ	331 217 D9		351 233 E9		371 249 F9
1 0 1 0	10	LF	212 138 8A	SUB	232 154 9A	Ϋ́	252 170 AA	Δ	272 186 BA	Υ	312 202 CA	μ	332 218 DA		352 234 EA		372 250 FA
1 0 1 1	11	VT	213 139 8B	ESC	233 155 9B	Ώ	253 171 AB	E	273 187 BB	Φ	313 203 CB	ν	333 219 DB		353 235 EB		373 251 FB
1 1 0 0	12	FF	214 140 8C	FS	234 156 9C	ά	254 172 AC	Z	274 188 BC	X	314 204 CC	ξ	334 220 DC		354 236 EC		374 252 FC
1 1 0 1	13	CR	215 141 8D	GS	235 157 9D	έ	255 173 AD	H	275 189 BD	Ψ	315 205 CD	ο	335 221 DD		355 237 ED		375 253 FD
1 1 1 0	14	SO	216 142 8E	RS	236 158 9E	ή	256 174 AE	Θ	276 190 BE	Ω	316 206 CE	π	336 222 DE		356 238 EE		376 254 FE
1 1 1 1	15	SI	217 143 8F	US	237 159 9F	ί	257 175 AF	I	277 191 BF	α	317 207 CF	ρ	337 223 DF		357 239 EF		377 255 FF

ECMA−94 Latin 1 European Extended Set: Graphics
Serial Matrix Emulation (80−9F=Control Codes)

KEY

BITS B7 B6 B5 / B4 B3 B2 B1	0 0 1
1 0 1 1	ESC — 33 (OCTAL), 27 (DECIMAL), 1B (HEX)

OCTAL
DECIMAL
HEX
CHARACTER

* IF ENABLED

B8*: 1 (all columns)

BITS B4 B3 B2 B1	ROW	Col 8 (B7 B6 B5 = 0 0 0)	Codes	Col 9 (0 0 1)	Codes	Col 10 (0 1 0)	Codes	Col 11 (0 1 1)	Codes	Col 12 (1 0 0)	Codes	Col 13 (1 0 1)	Codes	Col 14 (1 1 0)	Codes	Col 15 (1 1 1)	Codes
0 0 0 0	0	NUL	200 128 80	DLE	220 144 90		240 160 A0	2/5	260 176 B0	┘	300 192 C0	╝	320 208 D0	△	340 224 E0		360 240 F0
0 0 0 1	1	SOH	201 129 81	DC1 (XON)	221 145 91		241 161 A1	3/5	261 177 B1	┐	301 193 C1	╗	321 209 D1	▽	341 225 E1		361 241 F1
0 0 1 0	2	STX	202 130 82	DC2	222 146 92		242 162 A2	4/5	262 178 B2	┌	302 194 C2	╔	322 210 D2	▷	342 226 E2		362 242 F2
0 0 1 1	3	ETX	203 131 83	DC3 (XOFF)	223 147 93		243 163 A3	✓	263 179 B3	├	303 195 C3	╠	323 211 D3	◁	343 227 E3		363 243 F3
0 1 0 0	4	EOT	204 132 84	DC4	224 148 94	-	244 164 A4	♂	264 180 B4	┴	304 196 C4	╩	324 212 D4	▭	344 228 E4		364 244 F4
0 1 0 1	5	ENQ	205 133 85	NAK	225 149 95	–	245 165 A5	♀	265 181 B5	┤	305 197 C5	╣	325 213 D5	✩	345 229 E5		365 245 F5
0 1 1 0	6	ACK	206 134 86	SYN	226 150 96	—	246 166 A6	ƀ	266 182 B6	┬	306 198 C6	╦	326 214 D6	✱	346 230 E6		366 246 F6
0 1 1 1	7	BEL	207 135 87	ETB	227 151 97	―	247 167 A7	„	267 183 B7	┼	307 199 C7	╬	327 215 D7	⌖	347 231 E7		367 247 F7
1 0 0 0	8	BS	210 136 88	CAN	230 152 98	†	250 168 A8	℗	270 184 B8	╞	310 200 C8	╟	330 216 D8	└	350 232 E8		370 248 F8
1 0 0 1	9	HT	211 137 89	EM	231 153 99	‡	251 169 A9	♣	271 185 B9	╨	311 201 C9	╧	331 217 D9	┘	351 233 E9		371 249 F9
1 0 1 0	10	LF	212 138 8A	SUB	232 154 9A	✠	252 170 AA	◇	272 186 BA	╕	312 202 CA	╢	332 218 DA	┌	352 234 EA		372 250 FA
1 0 1 1	11	VT	213 139 8B	ESC	233 155 9B	¦	253 171 AB	♡	273 187 BB	╥	313 203 CB	╤	333 219 DB	┐	353 235 EB		373 251 FB
1 1 0 0	12	FF	214 140 8C	FS	234 156 9C	…	254 172 AC	♠	274 188 BC	╪	314 204 CC	╫	334 220 DC		354 236 EC		374 252 FC
1 1 0 1	13	CR	215 141 8D	GS	235 157 9D	1/3	255 173 AD	─	275 189 BD	═	315 205 CD	⌑	335 221 DD		355 237 ED		375 253 FD
1 1 1 0	14	SO	216 142 8E	RS	236 158 9E	2/3	256 174 AE	│	276 190 BE	║	316 206 CE	⬡	336 222 DE		356 238 EE		376 254 FE
1 1 1 1	15	SI	217 143 8F	US	237 159 9F	1/5	257 175 AF	└	277 191 BF	╙	317 207 CF	□	337 223 DF		357 239 EF		377 255 FF

ECMA−94 Latin 1 European Extended Set: Scientific Serial Matrix Emulation (80−9F=Control Codes)

KEY

BITS B7 B6 B5 / B4 B3 B2 B1	0 0 1	
1 0 1 1	ESC (CHARACTER)	33 (OCTAL) 27 (DECIMAL) 1B (HEX)

* IF ENABLED

B8*		1		1		1		1		1		1		1		1	
BITS B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
B4 B3 B2 B1	ROW	COLUMN 8		9		10		11		12		13		14		15	
0 0 0 0	0	NUL	200 128 80	DLE	220 144 90		240 160 A0	⇔	260 176 B0	ϰ	300 192 C0	χ	320 208 D0	√	340 224 E0		360 240 F0
0 0 0 1	1	SOH	201 129 81	DC1 (XON)	221 145 91	≡	241 161 A1	¬	261 177 B1	λ	301 193 C1	ψ	321 209 D1	ƒ	341 225 E1		361 241 F1
0 0 1 0	2	STX	202 130 82	DC2	222 146 92	∧	242 162 A2	∀	262 178 B2	ƛ	302 194 C2	Ψ	322 210 D2	∝	342 226 E2		362 242 F2
0 0 1 1	3	ETX	203 131 83	DC3 (XOFF)	223 147 93	∨	243 163 A3	∃	263 179 B3	ν	303 195 C3	ω	323 211 D3	1/11	343 227 E3		363 243 F3
0 1 0 0	4	EOT	204 132 84	DC4	224 148 94	∩	244 164 A4	α	264 180 B4	ξ	304 196 C4	∫	324 212 D4	χ	344 228 E4		364 244 F4
0 1 0 1	5	ENQ	205 133 85	NAK	225 149 95	∪	245 165 A5	β	265 181 B5	Ξ	305 197 C5	∮	325 213 D5	□	345 229 E5		365 245 F5
0 1 1 0	6	ACK	206 134 86	SYN	226 150 96	⊂	246 166 A6	γ	266 182 B6	π	306 198 C6	∞	326 214 D6	‖	346 230 E6		366 246 F6
0 1 1 1	7	BEL	207 135 87	ETB	227 151 97	⊃	247 167 A7	Γ	267 183 B7	Π	307 199 C7	∇	327 215 D7	⊥	347 231 E7		367 247 F7
1 0 0 0	8	BS	210 136 88	CAN	230 152 98	⇐	250 168 A8	δ	270 184 B8	ϱ	310 200 C8	∂	330 216 D8	♃	350 232 E8		370 248 F8
1 0 0 1	9	HT	211 137 89	EM	231 153 99	⇒	251 169 A9	Δ	271 185 B9	σ	311 201 C9	∼	331 217 D9	∟	351 233 E9		371 249 F9
1 0 1 0	10	LF	212 138 8A	SUB	232 154 9A	∴	252 170 AA	ε	272 186 BA	Σ	312 202 CA	≈	332 218 DA	<	352 234 EA		372 250 FA
1 0 1 1	11	VT	213 139 8B	ESC	233 155 9B	∵	253 171 AB	ζ	273 187 BB	τ	313 203 CB	≃	333 219 DB	>	353 235 EB		373 251 FB
1 1 0 0	12	FF	214 140 8C	FS	234 156 9C	∈	254 172 AC	η	274 188 BC	υ	314 204 CC	≅	334 220 DC	′	354 236 EC		374 252 FC
1 1 0 1	13	CR	215 141 8D	GS	235 157 9D	∋	255 173 AD	Θ	275 189 BD	Υ	315 205 CD	≤	335 221 DD	″	355 237 ED		375 253 FD
1 1 1 0	14	SO	216 142 8E	RS	236 158 9E	⊆	256 174 AE	[illegible]	276 190 BE	ø	316 206 CE	≠	336 222 DE	∓	356 238 EE		376 254 FE
1 1 1 1	15	SI	217 143 8F	US	237 159 9F	⊇	257 175 AF	ι	277 191 BF	Φ	317 207 CF	≥	337 223 DF		357 239 EF		377 255 FF

ECMA−94 Latin 1 Primary Character Set
Serial Matrix Emulation (80−9F=Printable Symbols)

See the ECMA 94 Latin 1 International Languages Substitution Table for the International Language selected.

NOTE: In the OCR−A print mode with ASCII International Language selected, the characters at addresses 5F, 60 and 7E will be replaced by the Fork, Chair, and Hook, respectively.

* IF ENABLED

BITS B4 B3 B2 B1	ROW	0		1		2		3		4		5		6		7	
B8*		0		0		0		0		0		0		0		0	
B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
0 0 0 0	0	NUL	0 0 0	DLE	20 16 10		40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1	SOH	1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2	STX	2 2 2	DC2	22 18 12	"	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3		3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4		4 4 4	DC4	24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5		5 5 5		25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6		6 6 6	SYN	26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7	ETB	27 23 17	'	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9	EM	31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 0 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 0 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 0 C	FS	34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	|	174 124 7C
1 1 0 1	13	CR	15 13 0 D	GS	35 29 1D	–	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 0 E	RS	36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 0 F	US	37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F	DEL	177 127 7F

ECMA−94 Latin 1 European Extended Set: Barcode Serial Matrix Emulation (80−9F=Printable Symbols)

KEY

B7 B6 B5 BITS B4 B3 B2 B1	0 0 1
1 0 1 1	ESC 33 (OCTAL) 27 (DECIMAL) 1B (HEX) — CHARACTER

* IF ENABLED

B8*		1	1	1	1	1	1	1	1
B7 B6 B5 BITS		0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1
B4 B3 B2 B1	ROW	COLUMN 8	9	10	11	12	13	14	15
0 0 0 0	0	200 128 80	220 144 90	240 160 A0	260 176 B0	300 192 C0	320 208 D0	340 224 E0	360 240 F0
0 0 0 1	1	201 129 81	221 145 91	241 161 A1	261 177 B1	301 193 C1	321 209 D1	341 225 E1	361 241 F1
0 0 1 0	2	202 130 82	222 146 92	242 162 A2	262 178 B2	302 194 C2	322 210 D2	342 226 E2	362 242 F2
0 0 1 1	3	203 131 83	223 147 93	243 163 A3	263 179 B3	303 195 C3	323 211 D3	343 227 E3	363 243 F3
0 1 0 0	4	204 132 84	224 148 94	244 164 A4	264 180 B4	304 196 C4	324 212 D4	344 228 E4	364 244 F4
0 1 0 1	5	205 133 85	225 149 95	245 165 A5	265 181 B5	305 197 C5	325 213 D5	345 229 E5	365 245 F5
0 1 1 0	6	206 134 86	226 150 96	246 166 A6	266 182 B6	306 198 C6	326 214 D6	346 230 E6	366 246 F6
0 1 1 1	7	207 135 87	227 151 97	247 167 A7	267 183 B7	307 199 C7	327 215 D7	347 231 E7	367 247 F7
1 0 0 0	8	210 136 88	230 152 98	250 168 A8	270 184 B8	310 200 C8	330 216 D8	350 232 E8	370 248 F8
1 0 0 1	9	211 137 89	231 153 99	251 169 A9	271 185 B9	311 201 C9	331 217 D9	351 233 E9	371 249 F9
1 0 1 0	10	212 138 8A	232 154 9A	252 170 AA	272 186 BA	312 202 CA	332 218 DA	352 234 EA	372 250 FA
1 0 1 1	11	213 139 8B	233 155 9B	253 171 AB	273 187 BB	313 203 CB	333 219 DB	353 235 EB	373 251 FB
1 1 0 0	12	214 140 8C	234 156 9C	254 172 AC	274 188 BC	314 204 CC	334 220 DC	354 236 EC	374 252 FC
1 1 0 1	13	215 141 8D	235 157 9D	255 173 AD	275 189 BD	315 205 CD	335 221 DD	355 237 ED	375 253 FD
1 1 1 0	14	216 142 8E	236 158 9E	256 174 AE	276 190 BE	316 206 CE	336 222 DE	356 238 EE	376 254 FE
1 1 1 1	15	217 143 8F	237 159 9F	257 175 AF	277 191 BF	317 207 CF	337 223 DF	357 239 EF	377 255 FF

ECMA−94 Latin 1 European Extended Set: Multinational Serial Matrix Emulation (80−9F=Printable Symbols)

KEY

BITS B7 B6 B5 / B4 B3 B2 B1	0 0 1	
1 0 1 1	ESC	33 27 1B

ESC = CHARACTER; 33 = OCTAL; 27 = DECIMAL; 1B = HEX

* IF ENABLED

B8*		1		1		1		1		1		1		1		1	
BITS B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
B4 B3 B2 B1	ROW	COLUMN 8		9		10		11		12		13		14		15	
0 0 0 0	0	¿	200 128 80	⁎	220 144 90		240 160 A0	°	260 176 B0	À	300 192 C0	Đ	320 208 D0	à	340 224 E0	đ	360 240 F0
0 0 0 1	1	¿	201 129 81	█	221 145 91	¡	241 161 A1	±	261 177 B1	Á	301 193 C1	Ñ	321 209 D1	á	341 225 E1	ñ	361 241 F1
0 0 1 0	2	₧	202 130 82		222 146 92	‚	242 162 A2	²	262 178 B2	Â	302 194 C2	Ò	322 210 D2	â	342 226 E2	ò	362 242 F2
0 0 1 1	3	|	203 131 83		223 147 93	£	243 163 A3	³	263 179 B3	Ã	303 195 C3	Ó	323 211 D3	ã	343 227 E3	ó	363 243 F3
0 1 0 0	4	Π	204 132 84		224 148 94	¤	244 164 A4	´	264 180 B4	Ä	304 196 C4	Ô	324 212 D4	ä	344 228 E4	ô	364 244 F4
0 1 0 1	5	ı	205 133 85		225 149 95	¥	245 165 A5	µ	265 181 B5	Å	305 197 C5	Õ	325 213 D5	å	345 229 E5	õ	365 245 F5
0 1 1 0	6	Ğ	206 134 86		226 150 96	¦	246 166 A6	¶	266 182 B6	Æ	306 198 C6	Ö	326 214 D6	æ	346 230 E6	ö	366 246 F6
0 1 1 1	7	ğ	207 135 87		227 151 97	§	247 167 A7	·	267 183 B7	Ç	307 199 C7	×	327 215 D7	ç	347 231 E7	÷	367 247 F7
1 0 0 0	8	Ş	210 136 88		230 152 98	¨	250 168 A8	¸	270 184 B8	È	310 200 C8	Ø	330 216 D8	è	350 232 E8	ø	370 248 F8
1 0 0 1	9	ş	211 137 89		231 153 99	¿	251 169 A9	¹	271 185 B9	É	311 201 C9	Ù	331 217 D9	é	351 233 E9	ù	371 249 F9
1 0 1 0	10	İ	212 138 8A		232 154 9A	ª	252 170 AA	º	272 186 BA	Ê	312 202 CA	Ú	332 218 DA	ê	352 234 EA	ú	372 250 FA
1 0 1 1	11	¨	213 139 8B		233 155 9B	<<	253 171 AB	>>	273 187 BB	Ë	313 203 CB	Û	333 219 DB	ë	353 235 EB	û	373 251 FB
1 1 0 0	12	ˇ	214 140 8C		234 156 9C	¬	254 172 AC	¿	274 188 BC	Ì	314 204 CC	Ü	334 220 DC	ì	354 236 EC	ü	374 252 FC
1 1 0 1	13	ƒ	215 141 8D		235 157 9D	ÿ	255 173 AD	¿	275 189 BD	Í	315 205 CD	Ý	335 221 DD	í	355 237 ED	ý	375 253 FD
1 1 1 0	14	═	216 142 8E		236 158 9E	®	256 174 AE	¾	276 190 BE	Î	316 206 CE	¿	336 222 DE	î	356 238 EE	¿	376 254 FE
1 1 1 1	15	;	217 143 8F		237 159 9F	—	257 175 AF	¿	277 191 BF	Ï	317 207 CF	β	337 223 DF	ï	357 239 EF		377 255 FF

ECMA−94 Latin 1 European Extended Set: Greek
Serial Matrix Emulation (80−9F=Printable Symbols)

KEY

B7 B6 B5 BITS B4 B3 B2 B1	0 0 1	
1 0 1 1	ESC	33 27 1B

33 ← OCTAL; 27 ← DECIMAL; 1B ← HEX; ESC ← CHARACTER

* IF ENABLED

B8*		1		1		1		1		1		1		1		1	
BITS B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
B4 B3 B2 B1	ROW	COLUMN 8		9		10		11		12		13		14		15	
0 0 0 0	0		200 128 80		220 144 90		240 160 A0	ϊ	260 176 B0	Κ	300 192 C0	β	320 208 D0	σ	340 224 E0		360 240 F0
0 0 0 1	1		201 129 81		221 145 91	Ά	241 161 A1	ΐ	261 177 B1	Λ	301 193 C1	γ	321 209 D1	ς	341 225 E1		361 241 F1
0 0 1 0	2		202 130 82		222 146 92	Έ	242 162 A2	ό	262 178 B2	Μ	302 194 C2	δ	322 210 D2	τ	342 226 E2		362 242 F2
0 0 1 1	3		203 131 83		223 147 93	Ή	243 163 A3	ύ	263 179 B3	Ν	303 195 C3	ε	323 211 D3	υ	343 227 E3		363 243 F3
0 1 0 0	4		204 132 84		224 148 94	Ί	244 164 A4	ϋ	264 180 B4	Ξ	304 196 C4	ζ	324 212 D4	φ	344 228 E4		364 244 F4
0 1 0 1	5		205 133 85		225 149 95	Ϊ	245 165 A5	ΰ	265 181 B5	Ο	305 197 C5	η	325 213 D5	χ	345 229 E5		365 245 F5
0 1 1 0	6		206 134 86		226 150 96	Ϊ́	246 166 A6	ώ	266 182 B6	Π	306 198 C6	ϑ	326 214 D6	ψ	346 230 E6		366 246 F6
0 1 1 1	7		207 135 87		227 151 97	Ό	247 167 A7	Α	267 183 B7	Ρ	307 199 C7	ι	327 215 D7	ω	347 231 E7		367 247 F7
1 0 0 0	8		210 136 88		230 152 98	Ύ	250 168 A8	Β	270 184 B8	Σ	310 200 C8	ϰ	330 216 D8		350 232 E8		370 248 F8
1 0 0 1	9		211 137 89		231 153 99	Ϋ	251 169 A9	Γ	271 185 B9	Τ	311 201 C9	λ	331 217 D9		351 233 E9		371 249 F9
1 0 1 0	10		212 138 8A		232 154 9A	Ϋ́	252 170 AA	Δ	272 186 BA	Τ	312 202 CA	μ	332 218 DA		352 234 EA		372 250 FA
1 0 1 1	11		213 139 8B		233 155 9B	Ώ	253 171 AB	Ε	273 187 BB	Φ	313 203 CB	ν	333 219 DB		353 235 EB		373 251 FB
1 1 0 0	12		214 140 8C		234 156 9C	ά	254 172 AC	Ζ	274 188 BC	Χ	314 204 CC	ξ	334 220 DC		354 236 EC		374 252 FC
1 1 0 1	13		215 141 8D		235 157 9D	έ	255 173 AD	Η	275 189 BD	Ψ	315 205 CD	ο	335 221 DD		355 237 ED		375 253 FD
1 1 1 0	14		216 142 8E		236 158 9E	ή	256 174 AE	Θ	276 190 BE	Ω	316 206 CE	π	336 222 DE		356 238 EE		376 254 FE
1 1 1 1	15		217 143 8F		237 159 9F	ί	257 175 AF	Ι	277 191 BF	α	317 207 CF	ϱ	337 223 DF		357 239 EF		377 255 FF

ECMA−94 Latin 1 European Extended Set: Graphics
Serial Matrix Emulation (80−9F=Printable Symbols)

KEY

BITS B7 B6 B5 / B4 B3 B2 B1	0 0 1
1 0 1 1	ESC 33 (OCTAL) 27 (DECIMAL) 1B (HEX) — CHARACTER

* IF ENABLED

B8*		1	1	1	1	1	1	1	1
BITS B7 B6 B5		0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1
B4 B3 B2 B1	ROW	COLUMN 8	9	10	11	12	13	14	15
0 0 0 0	0	200 128 80	220 144 90	240 160 A0	2/5 260 176 B0	┘ 300 192 C0	╝ 320 208 D0	△ 340 224 E0	360 240 F0
0 0 0 1	1	201 129 81	221 145 91	241 161 A1	3/5 261 177 B1	┐ 301 193 C1	╗ 321 209 D1	▽ 341 225 E1	361 241 F1
0 0 1 0	2	202 130 82	222 146 92	242 162 A2	4/5 262 178 B2	┌ 302 194 C2	╔ 322 210 D2	▷ 342 226 E2	362 242 F2
0 0 1 1	3	203 131 83	223 147 93	243 163 A3	✓ 263 179 B3	├ 303 195 C3	╠ 323 211 D3	◁ 343 227 E3	363 243 F3
0 1 0 0	4	204 132 84	224 148 94	- 244 164 A4	♂ 264 180 B4	┴ 304 196 C4	╩ 324 212 D4	▭ 344 228 E4	364 244 F4
0 1 0 1	5	205 133 85	225 149 95	– 245 165 A5	♀ 265 181 B5	┤ 305 197 C5	╣ 325 213 D5	✩ 345 229 E5	365 245 F5
0 1 1 0	6	206 134 86	226 150 96	— 246 166 A6	ƀ 266 182 B6	┬ 306 198 C6	╦ 326 214 D6	✱ 346 230 E6	366 246 F6
0 1 1 1	7	207 135 87	227 151 97	—— 247 167 A7	„ 267 183 B7	┼ 307 199 C7	╬ 327 215 D7	⌖ 347 231 E7	367 247 F7
1 0 0 0	8	210 136 88	230 152 98	† 250 168 A8	℗ 270 184 B8	╞ 310 200 C8	╟ 330 216 D8	└ 350 232 E8	370 248 F8
1 0 0 1	9	211 137 89	231 153 99	‡ 251 169 A9	♣ 271 185 B9	╨ 311 201 C9	╧ 331 217 D9	┘ 351 233 E9	371 249 F9
1 0 1 0	10	212 138 8A	232 154 9A	✠ 252 170 AA	◇ 272 186 BA	╕ 312 202 CA	╢ 332 218 DA	┌ 352 234 EA	372 250 FA
1 0 1 1	11	213 139 8B	233 155 9B	¦ 253 171 AB	♡ 273 187 BB	╥ 313 203 CB	╤ 333 219 DB	┐ 353 235 EB	373 251 FB
1 1 0 0	12	214 140 8C	234 156 9C	… 254 172 AC	♠ 274 188 BC	╪ 314 204 CC	╫ 334 220 DC	354 236 EC	374 252 FC
1 1 0 1	13	215 141 8D	235 157 9D	1/3 255 173 AD	— 275 189 BD	═ 315 205 CD	¤ 335 221 DD	355 237 ED	375 253 FD
1 1 1 0	14	216 142 8E	236 158 9E	2/3 256 174 AE	| 276 190 BE	║ 316 206 CE	⬡ 336 222 DE	356 238 EE	376 254 FE
1 1 1 1	15	217 143 8F	237 159 9F	1/5 257 175 AF	└ 277 191 BF	╚ 317 207 CF	□ 337 223 DF	357 239 EF	377 255 FF

ECMA−94 Latin 1 European Extended Set: Scientific Serial Matrix Emulation (80−9F=Printable Symbols)

KEY

BITS B7 B6 B5 / B4 B3 B2 B1	0 0 1	
1 0 1 1	ESC	33 ← OCTAL 27 ← DECIMAL 1B ← HEX

ESC ↑ CHARACTER

* IF ENABLED

B8*		1		1		1		1		1		1		1		1	
BITS B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
B4 B3 B2 B1	ROW	COLUMN **8**		**9**		**10**		**11**		**12**		**13**		**14**		**15**	
0 0 0 0	0		200 128 80		220 144 90		240 160 A0	⇔	260 176 B0	ϰ	300 192 C0	χ	320 208 D0	√	340 224 E0		360 240 F0
0 0 0 1	1		201 129 81		221 145 91	≡	241 161 A1	¬	261 177 B1	λ	301 193 C1	ψ	321 209 D1	ƒ	341 225 E1		361 241 F1
0 0 1 0	2		202 130 82		222 146 92	∧	242 162 A2	∀	262 178 B2	Λ	302 194 C2	Ψ	322 210 D2	∝	342 226 E2		362 242 F2
0 0 1 1	3		203 131 83		223 147 93	∨	243 163 A3	∃	263 179 B3	ν	303 195 C3	ω	323 211 D3	1/11	343 227 E3		363 243 F3
0 1 0 0	4		204 132 84		224 148 94	∩	244 164 A4	α	264 180 B4	ξ	304 196 C4	∫	324 212 D4	χ	344 228 E4		364 244 F4
0 1 0 1	5		205 133 85		225 149 95	∪	245 165 A5	β	265 181 B5	Ξ	305 197 C5	∮	325 213 D5	□	345 229 E5		365 245 F5
0 1 1 0	6		206 134 86		226 150 96	⊂	246 166 A6	γ	266 182 B6	π	306 198 C6	∞	326 214 D6	‖	346 230 E6		366 246 F6
0 1 1 1	7		207 135 87		227 151 97	⊃	247 167 A7	Γ	267 183 B7	Π	307 199 C7	∇	327 215 D7	⊥	347 231 E7		367 247 F7
1 0 0 0	8		210 136 88		230 152 98	⇐	250 168 A8	δ	270 184 B8	ϱ	310 200 C8	∂	330 216 D8	♃	350 232 E8		370 248 F8
1 0 0 1	9		211 137 89		231 153 99	⇒	251 169 A9	Δ	271 185 B9	σ	311 201 C9	∼	331 217 D9	∟	351 233 E9		371 249 F9
1 0 1 0	10		212 138 8A		232 154 9A	∴	252 170 AA	ε	272 186 BA	Σ	312 202 CA	≈	332 218 DA	<	352 234 EA		372 250 FA
1 0 1 1	11		213 139 8B		233 155 9B	∵	253 171 AB	ζ	273 187 BB	τ	313 203 CB	≃	333 219 DB	>	353 235 EB		373 251 FB
1 1 0 0	12		214 140 8C		234 156 9C	∈	254 172 AC	η	274 188 BC	υ	314 204 CC	≅	334 220 DC	′	354 236 EC		374 252 FC
1 1 0 1	13		215 141 8D		235 157 9D	∋	255 173 AD	Θ	275 189 BD	Υ	315 205 CD	≤	335 221 DD	″	355 237 ED		375 253 FD
1 1 1 0	14		216 142 8E		236 158 9E	⊆	256 174 AE	ϑ	276 190 BE	ϕ	316 206 CE	≠	336 222 DE	∓	356 238 EE		376 254 FE
1 1 1 1	15		217 143 8F		237 159 9F	⊇	257 175 AF	ι	277 191 BF	Φ	317 207 CF	≥	337 223 DF		357 239 EF		377 255 FF

ECMA−94 Latin 1 International Languages Substitution Table

LANGUAGE	0021	0022	0023	0024	0040	005B	005C	005D	005E	0060	007B	007C	007D	007E
	Hex Address													
ASCII	!	″	#	$	@	[	\	]	^	`	{	|	}	~
German	!	″	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	β
Swedish	!	″	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
Danish	!	″	#	$	@	Æ	Ø	Å	^	°	æ	ø	å	~
Norwegian	!	″	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Finnish	!	″	#	¤	@	Ä	Ö	Å	^	`	ä	ö	å	ü
English	!	″	£	$	@	[	\	]	^	`	{	|	}	~
Dutch	!	″	£	$	@	[	¿	]	^	`	{	¿	}	~
French	!	″	#	$	à	û	ç	§	ô	ê	é	ù	è	î
Spanish	!	″	₧	$	@	Ã	Ñ	Õ	¡	`	ã	ñ	õ	¿
Italian	!	″	#	$	§	°	é	|	^	ù	à	ò	è	ì
Turkish	π	Ç	ç	ı	@	Ğ	Ö	Ü	ğ	Ş	ş	ö	ü	İ
Japanese	!	″	#	$	@	[	¥	]	^	`	{	|	}	~

Example: *005B = [in ASCII*
005B = Æ in Danish

DEC Multinational Character Set Charts

DEC Multinational Primary Character Set
P−Series Emulation (80−9F=Control Codes)

See the DEC Multinational International Languages Substitution Table for the International Language selected.

NOTE: In the OCR−A print mode with ASCII International Language selected, the characters at addresses 5F, 60 and 7E will be replaced by the Fork, Chair, and Hook, respectively.

* IF ENABLED

B8*		0		0		0		0		0		0		0		0	
B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
BITS B4 B3 B2 B1	ROW	COLUMN 0		1		2		3		4		5		6		7	
0 0 0 0	0	NUL	0 0 0	DLE	20 16 10		40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1	SOH	1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2	STX	2 2 2	DC2	22 18 12	"	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3	ETX	3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4	EOT	4 4 4	DC4	24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	ENQ	5 5 5	NAK	25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6	ACK	6 6 6	SYN	26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7	ETB	27 23 17	'	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9	EM	31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 0 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 0 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 0 C	FS	34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	|	174 124 7C
1 1 0 1	13	CR	15 13 0 D	GS	35 29 1D	–	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 0 E	RS	36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 0 F	US	37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F		177 127 7F

DEC Multinational Extended Set
P−Series Emulation (80−9F=Control Codes)

KEY

BITS B7 B6 B5 / B4 B3 B2 B1	0 0 1
1 0 1 1	ESC — 33 (OCTAL), 27 (DECIMAL), 1B (HEX)

CHARACTER

* IF ENABLED

BITS B4 B3 B2 B1	ROW	COLUMN 8 (B8* 1; B7 B6 B5 0 0 0)		9 (1; 0 0 1)		10 (1; 0 1 0)		11 (1; 0 1 1)		12 (1; 1 0 0)		13 (1; 1 0 1)		14 (1; 1 1 0)		15 (1; 1 1 1)	
0 0 0 0	0	NUL	200 128 80	DLE	220 144 90		240 160 A0	°	260 176 B0	À	300 192 C0		320 208 D0	à	340 224 E0		360 240 F0
0 0 0 1	1	SOH	201 129 81	DC1 (XON)	221 145 91	¡	241 161 A1	±	261 177 B1	Á	301 193 C1	Ñ	321 209 D1	á	341 225 E1	ñ	361 241 F1
0 0 1 0	2	STX	202 130 82	DC2	222 146 92	’	242 162 A2	²	262 178 B2	Â	302 194 C2	Ò	322 210 D2	â	342 226 E2	ò	362 242 F2
0 0 1 1	3	ETX	203 131 83	DC3 (XOFF)	223 147 93	£	243 163 A3	³	263 179 B3	Ã	303 195 C3	Ó	323 211 D3	ã	343 227 E3	ó	363 243 F3
0 1 0 0	4	EOT	204 132 84	DC4	224 148 94		244 164 A4		264 180 B4	Ä	304 196 C4	Ô	324 212 D4	ä	344 228 E4	ô	364 244 F4
0 1 0 1	5	ENQ	205 133 85	NAK	225 149 95	¥	245 165 A5	µ	265 181 B5	Å	305 197 C5	Õ	325 213 D5	å	345 229 E5	õ	365 245 F5
0 1 1 0	6	ACK	206 134 86	SYN	226 150 96		246 166 A6	¶	266 182 B6	Æ	306 198 C6	Ö	326 214 D6	æ	346 230 E6	ö	366 246 F6
0 1 1 1	7	BEL	207 135 87	ETB	227 151 97	§	247 167 A7	·	267 183 B7	Ç	307 199 C7	Œ	327 215 D7	ç	347 231 E7	œ	367 247 F7
1 0 0 0	8	BS	210 136 88	CAN	230 152 98	¤	250 168 A8		270 184 B8	È	310 200 C8	Ø	330 216 D8	è	350 232 E8	ø	370 248 F8
1 0 0 1	9	HT	211 137 89	EM	231 153 99	¿	251 169 A9	¹	271 185 B9	É	311 201 C9	Ù	331 217 D9	é	351 233 E9	ù	371 249 F9
1 0 1 0	10	LF	212 138 8A	SUB	232 154 9A	ª	252 170 AA	º	272 186 BA	Ê	312 202 CA	Ú	332 218 DA	ê	352 234 EA	ú	372 250 FA
1 0 1 1	11	VT	213 139 8B	ESC	233 155 9B	«	253 171 AB	»	273 187 BB	Ë	313 203 CB	Û	333 219 DB	ë	353 235 EB	û	373 251 FB
1 1 0 0	12	FF	214 140 8C	FS	234 156 9C		254 172 AC	¿	274 188 BC	Ì	314 204 CC	Ü	334 220 DC	ì	354 236 EC	ü	374 252 FC
1 1 0 1	13	CR	215 141 8D	GS	235 157 9D		255 173 AD	¿	275 189 BD	Í	315 205 CD	Ÿ	335 221 DD	í	355 237 ED	ÿ	375 253 FD
1 1 1 0	14	SO	216 142 8E	RS	236 158 9E		256 174 AE		276 190 BE	Î	316 206 CE		336 222 DE	î	356 238 EE		376 254 FE
1 1 1 1	15	SI	217 143 8F	US	237 159 9F		257 175 AF	¿	277 191 BF	Ï	317 207 CF	β	337 223 DF	ï	357 239 EF		377 255 FF

DEC Multinational Primary Character Set
P−Series Emulation (80−9F=Printable Symbols)

See the DEC Multinational International Languages Substitution Table for the International Language selected.

NOTE: In the OCR−A print mode with ASCII International Language selected, the characters at addresses 5F, 60 and 7E will be replaced by the Fork, Chair, and Hook, respectively.

* IF ENABLED

BITS B4 B3 B2 B1	ROW	Col 0		Col 1		Col 2		Col 3		Col 4		Col 5		Col 6		Col 7	
B8*		0		0		0		0		0		0		0		0	
B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
COLUMN		0		1		2		3		4		5		6		7	
0 0 0 0	0	NUL	0 0 0	DLE	20 16 10		40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1	SOH	1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2	STX	2 2 2	DC2	22 18 12	″	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3	ETX	3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4	EOT	4 4 4	DC4	24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	ENQ	5 5 5	NAK	25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6	ACK	6 6 6	SYN	26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7	ETB	27 23 17	′	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9	EM	31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 0 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 0 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 0 C	FS	34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	|	174 124 7C
1 1 0 1	13	CR	15 13 0 D	GS	35 29 1D	–	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 0 E	RS	36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 0 F	US	37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F		177 127 7F

DEC Multinational Extended Set
P−Series Emulation (80−9F=Printable Symbols)

KEY

BITS B7 B6 B5 / B4 B3 B2 B1	0 0 1	
1 0 1 1	ESC	33 27 1B

OCTAL
DECIMAL
HEX
CHARACTER

* IF ENABLED

BITS B4 B3 B2 B1	ROW	COLUMN 8		9		10		11		12		13		14		15	
B8*		1		1		1		1		1		1		1		1	
B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
0 0 0 0	0		200 128 80		220 144 90		240 160 A0	°	260 176 B0	À	300 192 C0		320 208 D0	à	340 224 E0		360 240 F0
0 0 0 1	1		201 129 81		221 145 91	¡	241 161 A1	±	261 177 B1	Á	301 193 C1	Ñ	321 209 D1	á	341 225 E1	ñ	361 241 F1
0 0 1 0	2		202 130 82		222 146 92	’	242 162 A2	2	262 178 B2	Â	302 194 C2	Ò	322 210 D2	â	342 226 E2	ò	362 242 F2
0 0 1 1	3		203 131 83		223 147 93	£	243 163 A3	3	263 179 B3	Ã	303 195 C3	Ó	323 211 D3	ã	343 227 E3	ó	363 243 F3
0 1 0 0	4		204 132 84		224 148 94		244 164 A4		264 180 B4	Ä	304 196 C4	Ô	324 212 D4	ä	344 228 E4	ô	364 244 F4
0 1 0 1	5		205 133 85		225 149 95	¥	245 165 A5	µ	265 181 B5	Å	305 197 C5	Õ	325 213 D5	å	345 229 E5	õ	365 245 F5
0 1 1 0	6		206 134 86		226 150 96		246 166 A6	¶	266 182 B6	Æ	306 198 C6	Ö	326 214 D6	æ	346 230 E6	ö	366 246 F6
0 1 1 1	7		207 135 87		227 151 97	§	247 167 A7	·	267 183 B7	Ç	307 199 C7	Œ	327 215 D7	ç	347 231 E7	œ	367 247 F7
1 0 0 0	8		210 136 88		230 152 98	¤	250 168 A8		270 184 B8	È	310 200 C8	Ø	330 216 D8	è	350 232 E8	ø	370 248 F8
1 0 0 1	9		211 137 89		231 153 99	¿	251 169 A9	1	271 185 B9	É	311 201 C9	Ù	331 217 D9	é	351 233 E9	ù	371 249 F9
1 0 1 0	10		212 138 8A		232 154 9A	a	252 170 AA	o	272 186 BA	Ê	312 202 CA	Ú	332 218 DA	ê	352 234 EA	ú	372 250 FA
1 0 1 1	11		213 139 8B		233 155 9B	<<	253 171 AB	>>	273 187 BB	Ë	313 203 CB	Û	333 219 DB	ë	353 235 EB	û	373 251 FB
1 1 0 0	12		214 140 8C		234 156 9C		254 172 AC	¿	274 188 BC	Ì	314 204 CC	Ü	334 220 DC	ì	354 236 EC	ü	374 252 FC
1 1 0 1	13		215 141 8D		235 157 9D		255 173 AD	¿	275 189 BD	Í	315 205 CD	Ÿ	335 221 DD	í	355 237 ED	ÿ	375 253 FD
1 1 1 0	14		216 142 8E		236 158 9E		256 174 AE		276 190 BE	Î	316 206 CE		336 222 DE	î	356 238 EE		376 254 FE
1 1 1 1	15		217 143 8F		237 159 9F		257 175 AF	¿	277 191 BF	Ï	317 207 CF	β	337 223 DF	ï	357 239 EF		377 255 FF

DEC Multinational Primary Character Set
Serial Matrix Emulation (80−9F=Control Codes)

See the DEC Multinational International Languages Substitution Table for the International Language selected.

NOTE: In the OCR−A print mode with ASCII International Language selected, the characters at addresses 5F, 60 and 7E will be replaced by the Fork, Chair, and Hook, respectively.

* IF ENABLED

B8*		0		0		0		0		0		0		0		0	
BITS B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
B4 B3 B2 B1	ROW	COLUMN 0		1		2		3		4		5		6		7	
0 0 0 0	0	NUL	0 0 0	DLE	20 16 10		40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1	SOH	1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2	STX	2 2 2	DC2	22 18 12	"	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3	ETX	3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4	EOT	4 4 4	DC4	24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	ENQ	5 5 5	NAK	25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6	ACK	6 6 6	SYN	26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7	ETB	27 23 17	'	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9	EM	31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 0 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 0 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 0 C	FS	34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	|	174 124 7C
1 1 0 1	13	CR	15 13 0 D	GS	35 29 1D	–	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 0 E	RS	36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 0 F	US	37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F	DEL	177 127 7F

DEC Multinational Extended Set
Serial Matrix Emulation (80−9F=Control Codes)

KEY

B7 B6 B5 BITS B4 B3 B2 B1	0 0 1	
1 0 1 1	ESC	33 27 1B

33 = OCTAL; 27 = DECIMAL; 1B = HEX; ESC = CHARACTER

* IF ENABLED

B8*			1		1		1		1		1		1		1		1	
BITS B7 B6 B5			0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
B4 B3 B2 B1	ROW	COLUMN	8		9		10		11		12		13		14		15	
0 0 0 0	0		NUL	200 128 80	DLE	220 144 90		240 160 A0	°	260 176 B0	À	300 192 C0		320 208 D0	à	340 224 E0		360 240 F0
0 0 0 1	1		SOH	201 129 81	DC1 (XON)	221 145 91	¡	241 161 A1	±	261 177 B1	Á	301 193 C1	Ñ	321 209 D1	á	341 225 E1	ñ	361 241 F1
0 0 1 0	2		STX	202 130 82	DC2	222 146 92	’	242 162 A2	2	262 178 B2	Â	302 194 C2	Ò	322 210 D2	â	342 226 E2	ò	362 242 F2
0 0 1 1	3		ETX	203 131 83	DC3 (XOFF)	223 147 93	£	243 163 A3	3	263 179 B3	Ã	303 195 C3	Ó	323 211 D3	ã	343 227 E3	ó	363 243 F3
0 1 0 0	4		EOT	204 132 84	DC4	224 148 94		244 164 A4		264 180 B4	Ä	304 196 C4	Ô	324 212 D4	ä	344 228 E4	ô	364 244 F4
0 1 0 1	5		ENQ	205 133 85	NAK	225 149 95	¥	245 165 A5	µ	265 181 B5	Å	305 197 C5	Õ	325 213 D5	å	345 229 E5	õ	365 245 F5
0 1 1 0	6		ACK	206 134 86	SYN	226 150 96		246 166 A6	¶	266 182 B6	Æ	306 198 C6	Ö	326 214 D6	æ	346 230 E6	ö	366 246 F6
0 1 1 1	7		BEL	207 135 87	ETB	227 151 97	§	247 167 A7	·	267 183 B7	Ç	307 199 C7	Œ	327 215 D7	ç	347 231 E7	œ	367 247 F7
1 0 0 0	8		BS	210 136 88	CAN	230 152 98	¤	250 168 A8		270 184 B8	È	310 200 C8	Ø	330 216 D8	è	350 232 E8	ø	370 248 F8
1 0 0 1	9		HT	211 137 89	EM	231 153 99	¿	251 169 A9	1	271 185 B9	É	311 201 C9	Ù	331 217 D9	é	351 233 E9	ù	371 249 F9
1 0 1 0	10		LF	212 138 8A	SUB	232 154 9A	a	252 170 AA	o	272 186 BA	Ê	312 202 CA	Ú	332 218 DA	ê	352 234 EA	ú	372 250 FA
1 0 1 1	11		VT	213 139 8B	ESC	233 155 9B	<<	253 171 AB	>>	273 187 BB	Ë	313 203 CB	Û	333 219 DB	ë	353 235 EB	û	373 251 FB
1 1 0 0	12		FF	214 140 8C	FS	234 156 9C		254 172 AC	¿	274 188 BC	Ì	314 204 CC	Ü	334 220 DC	ì	354 236 EC	ü	374 252 FC
1 1 0 1	13		CR	215 141 8D	GS	235 157 9D		255 173 AD	¿	275 189 BD	Í	315 205 CD	Ÿ	335 221 DD	í	355 237 ED	ÿ	375 253 FD
1 1 1 0	14		SO	216 142 8E	RS	236 158 9E		256 174 AE		276 190 BE	Î	316 206 CE		336 222 DE	î	356 238 EE		376 254 FE
1 1 1 1	15		SI	217 143 8F	US	237 159 9F		257 175 AF	¿	277 191 BF	Ï	317 207 CF	β	337 223 DF	ï	357 239 EF		377 255 FF

DEC Multinational Primary Character Set
Serial Matrix Emulation (80−9F=Printable Symbols)

See the DEC Multinational International Languages Substitution Table for the International Language selected.

NOTE: In the OCR−A print mode with ASCII International Language selected, the characters at addresses 5F, 60 and 7E will be replaced by the Fork, Chair, and Hook, respectively.

* IF ENABLED

B8*		0		0		0		0		0		0		0		0	
B7 B6 B5		0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
BITS B4 B3 B2 B1	ROW	COLUMN 0		1		2		3		4		5		6		7	
0 0 0 0	0	NUL	0 0 0	DLE	20 16 10		40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1	SOH	1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2	STX	2 2 2	DC2	22 18 12	"	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3		3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4		4 4 4	DC4	24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5		5 5 5		25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6		6 6 6	SYN	26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7	ETB	27 23 17	'	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9	EM	31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 0 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 0 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 0 C	FS	34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	|	174 124 7C
1 1 0 1	13	CR	15 13 0 D	GS	35 29 1D	–	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 0 E	RS	36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 0 F	US	37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F	DEL	177 127 7F

DEC Multinational Extended Set
Serial Matrix Emulation (80−9F=Printable Symbols)

KEY

BITS B7 B6 B5 / B4 B3 B2 B1	0 0 1	
1 0 1 1	ESC	33 27 1B

OCTAL
DECIMAL
HEX
CHARACTER

* IF ENABLED

B8*			1		1		1		1		1		1		1		1	
BITS B7 B6 B5			0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
B4 B3 B2 B1	ROW	COLUMN	8		9		10		11		12		13		14		15	
0 0 0 0	0			200 128 80		220 144 90		240 160 A0	°	260 176 B0	À	300 192 C0		320 208 D0	à	340 224 E0		360 240 F0
0 0 0 1	1			201 129 81		221 145 91	¡	241 161 A1	±	261 177 B1	Á	301 193 C1	Ñ	321 209 D1	á	341 225 E1	ñ	361 241 F1
0 0 1 0	2			202 130 82		222 146 92	’	242 162 A2	2	262 178 B2	Â	302 194 C2	Ò	322 210 D2	â	342 226 E2	ò	362 242 F2
0 0 1 1	3			203 131 83		223 147 93	£	243 163 A3	3	263 179 B3	Ã	303 195 C3	Ó	323 211 D3	ã	343 227 E3	ó	363 243 F3
0 1 0 0	4			204 132 84		224 148 94		244 164 A4		264 180 B4	Ä	304 196 C4	Ô	324 212 D4	ä	344 228 E4	ô	364 244 F4
0 1 0 1	5			205 133 85		225 149 95	¥	245 165 A5	µ	265 181 B5	Å	305 197 C5	Õ	325 213 D5	å	345 229 E5	õ	365 245 F5
0 1 1 0	6			206 134 86		226 150 96		246 166 A6	¶	266 182 B6	Æ	306 198 C6	Ö	326 214 D6	æ	346 230 E6	ö	366 246 F6
0 1 1 1	7			207 135 87		227 151 97	§	247 167 A7	·	267 183 B7	Ç	307 199 C7	Œ	327 215 D7	ç	347 231 E7	œ	367 247 F7
1 0 0 0	8			210 136 88		230 152 98	¤	250 168 A8		270 184 B8	È	310 200 C8	Ø	330 216 D8	è	350 232 E8	ø	370 248 F8
1 0 0 1	9			211 137 89		231 153 99	¿	251 169 A9	1	271 185 B9	É	311 201 C9	Ù	331 217 D9	é	351 233 E9	ù	371 249 F9
1 0 1 0	10			212 138 8A		232 154 9A	a	252 170 AA	o	272 186 BA	Ê	312 202 CA	Ú	332 218 DA	ê	352 234 EA	ú	372 250 FA
1 0 1 1	11			213 139 8B		233 155 9B	<<	253 171 AB	>>	273 187 BB	Ë	313 203 CB	Û	333 219 DB	ë	353 235 EB	û	373 251 FB
1 1 0 0	12			214 140 8C		234 156 9C		254 172 AC	¿	274 188 BC	Ì	314 204 CC	Ü	334 220 DC	ì	354 236 EC	ü	374 252 FC
1 1 0 1	13			215 141 8D		235 157 9D		255 173 AD	¿	275 189 BD	Í	315 205 CD	Ÿ	335 221 DD	í	355 237 ED	ÿ	375 253 FD
1 1 1 0	14			216 142 8E		236 158 9E		256 174 AE		276 190 BE	Î	316 206 CE		336 222 DE	î	356 238 EE		376 254 FE
1 1 1 1	15			217 143 8F		237 159 9F		257 175 AF	¿	277 191 BF	Ï	317 207 CF	β	337 223 DF	ï	357 239 EF		377 255 FF

DEC Multinational International Languages Substitution Table

<table>
<tr><th></th><th colspan="12">Hex Address</th></tr>
<tr><th>LANGUAGE</th><th>0023</th><th>0040</th><th>005B</th><th>005C</th><th>005D</th><th>005E</th><th>005F</th><th>0060</th><th>007B</th><th>007C</th><th>007D</th><th>007E</th></tr>
<tr><td>ASCII</td><td>#</td><td>@</td><td>[</td><td>\</td><td>]</td><td>^</td><td>_</td><td>`</td><td>{</td><td>|</td><td>}</td><td>~</td></tr>
<tr><td>French</td><td>£</td><td>à</td><td>°</td><td>ç</td><td>§</td><td>^</td><td>_</td><td>`</td><td>é</td><td>ù</td><td>è</td><td>¨</td></tr>
<tr><td>German</td><td>#</td><td>§</td><td>Ä</td><td>Ö</td><td>Ü</td><td>^</td><td>_</td><td>`</td><td>ä</td><td>ö</td><td>ü</td><td>β</td></tr>
<tr><td>English</td><td>£</td><td>@</td><td>[</td><td>\</td><td>]</td><td>^</td><td>_</td><td>`</td><td>{</td><td>|</td><td>}</td><td>~</td></tr>
<tr><td>Norwegian/ Danish</td><td>#</td><td>Ä</td><td>Æ</td><td>Ø</td><td>Å</td><td>Ü</td><td>_</td><td>ä</td><td>æ</td><td>ø</td><td>å</td><td>ü</td></tr>
<tr><td>Swedish</td><td>#</td><td>É</td><td>Ä</td><td>Ö</td><td>Å</td><td>Ü</td><td>_</td><td>é</td><td>ä</td><td>ö</td><td>å</td><td>ü</td></tr>
<tr><td>Italian</td><td>£</td><td>§</td><td>°</td><td>ç</td><td>é</td><td>^</td><td>_</td><td>ù</td><td>à</td><td>ò</td><td>è</td><td>ì</td></tr>
<tr><td>Spanish</td><td>£</td><td>@</td><td>¡</td><td>Ñ</td><td>¿</td><td>^</td><td>_</td><td>`</td><td>°</td><td>ñ</td><td>ç</td><td>~</td></tr>
<tr><td>Japanese</td><td>#</td><td>@</td><td>[</td><td>¥</td><td>]</td><td>^</td><td>_</td><td>`</td><td>{</td><td>|</td><td>}</td><td>~</td></tr>
<tr><td>French Canadian</td><td>#</td><td>à</td><td>â</td><td>ç</td><td>ê</td><td>î</td><td>_</td><td>ô</td><td>é</td><td>ù</td><td>è</td><td>û</td></tr>
<tr><td>Dutch</td><td>ù</td><td>à</td><td>é</td><td>ç</td><td>ê</td><td>î</td><td>è</td><td>ô</td><td>ä</td><td>ö</td><td>ü</td><td>û</td></tr>
<tr><td>Finnish</td><td>#</td><td>@</td><td>Ä</td><td>Ö</td><td>Å</td><td>Ü</td><td>_</td><td>é</td><td>ä</td><td>ö</td><td>å</td><td>ü</td></tr>
<tr><td>Swiss</td><td>£</td><td>¾</td><td>¿</td><td>¿</td><td>|</td><td>^</td><td>_</td><td>`</td><td>¨</td><td>ƒ</td><td>¿</td><td>´</td></tr>
</table>

Example: *005B = [in ASCII*
005B = Æ in Danish

APPENDIX C

SPECIFICATIONS

Printing Characteristics

Printer throughput, in lines per minute (LPM), is a factor of the selected print mode. The P9012 nominal print rates are listed in Table C−1 on page C−2, and assume a tolerance of 5% and an adequate input data rate. Printing speed is independent of the number of characters configured in the character set repertoire. Print lines containing bold/emphasized (shadow) printing, superscripts, subscripts, or elongated (double high) attributes will print at approximately one−half the rates shown in the table.

Physical Characteristics

Printer Dimensions

Height	41.7 inches (105.9 cm)
Width	34.0 inches (86.4 cm)
Depth	28.5 inches (72.4 cm)
Weight	Approximately 335 lbs. (152 kg)

Shipping Dimensions

Height	50.0 inches (127 cm)
Width	34.75 inches (88.3 cm)
Depth	40.0 inches (101.6 cm)
Weight	Approximately 462 lbs. (210 kg)

Table C−1. P9012 Print Rates

PRINT APPLICATION DOT DENSITY (DPI) H X V NOTE 1	CHARACTERS PER INCH	DOT MATRIX NOTE 2	PERFORMANCE		
			UPPERCASE ONLY	UPPER & LOWERCASE	PLOT MODE
			LPM	LPM	IPM
HIGH SPEED A 60 (120) X 48	10 12 13.3	5 (9) X 5 + 1 4 (7) X 5 + 1 4 (7) X 5 + 1	1200	1030	150
HIGH SPEED B 60 (120) X 72	10 12 13.3 15 17.1	5 (9) X 6 + 1 4 (7) X 6 + 1 4 (7) X 6 + 1 3 (5) X 6 + 1 3 (5) X 6 + 1	1030*	900	100
HIGH SPEED C 60 (120) X 72	10 12 13.3 15 17.1	5 (9) X 6 + 2 4 (7) X 6 + 2 4 (7) X 6 + 2 3 (5) X 6 + 2 3 (5) X 6 + 2	1030* *1030 lpm at 8 lpi	800	100
DATA PROCESSING 60 (120) X 72	10 12 13.3 15 17.1	5 (9) X 7 + 2 4 (7) X 7 + 2 4 (7) X 7 + 2 3 (5) X 7 + 2 3 (5) X 7 + 2	900	720	100
CORRESPONDENCE 90 (180) X 96	10 12 15	7 (13) X 9 + 3 6 (11) X 9 + 3 5 (9) X 9 + 3	480	370	50
OCR A and B 120 (120) X 144	10	9 (9) X 13 + 3	480	423	100

NOTE 1 A (B) X C, where:
A is maximum horizontal dot density
B is horizontal dot placement density
C is vertical dot density

NOTE 2 D (E) X F + G, where:
D is maximum number of dots that may be placed on
E horizontal dot positions
F is number of vertical dots for uppercase symbols
G is number of dots available for descenders

Environmental Characteristics

Temperature

Operating	5 to 40°C
Storage	− 40 to 70°C

Relative Humidity

Operating	10% to 90% (noncondensing)
Storage	5% to 95% (noncondensing)

Acoustic Noise

Less than 55 dBA (tested at 132 column, DP at 10 cpi per ISO 7779)

Electrical Characteristics

Input Power

Voltage	120 or 240 VAC
Phase	Single
Frequency	50 or 60 Hz

Power Rating

Nominal Standby	330 VA 60 Hz (200 Watts)
Nominal Operating	830 VA 60 Hz (520 Watts)

Dissipated Power Per Hour

Standby	680 BTUs
Printing	1,780 BTUs

Data Input Rate (maximum)

Dataproducts	500,000 characters per second
Centronics	200,000 characters per second
RS−232	Up to 19.2K Baud

RFI

Radio Frequency Interference Tested/Certified to RFI Standards FCC 15 Class A; VDE 0871 Class B; CSA C108.8−M1983 Class A.

Interfaces

Type	Resident parallel and serial
Logic Levels	TTL/RS−232
Data Format	ASCII
Compatibility	Centronics, Dataproducts, RS−232C
Buffer Size	512, 1024, or 2048 characters

Forms

Paper

Type	Edge−perforated, fanfold, 3 to 16 inches wide
Thickness	Single−part − 15 to 100 pound stock Multi−part − 1− to 6−part forms
Sheet Thickness	0.025 inches maximum
Drive	Adjustable tractors (8−pin engagement)
Slew Rate	20 inches−per−second maximum

Labels

On Backing	One−part continuous perforated fanfold back form. Labels must be placed at least 1/6 inch from the fanfold perforation. Backing adhesive must not be squeezed out during printing.
Sheet Size	3− to 16−inches wide, including the two standard perforated tractor feed strips. A maximum sheet size of 12 inches between top and bottom perforations.
Thickness	Not to exceed 0.025−inch (including backing sheet).

Forms Control

Skip−Over Perforation	1, 1/2, 2/3, 5/6 inch; Control Panel Selectable
Vertical Format Units (VFU)	IBM Serial Matrix Vertical Tabs P−Series: EVFU Dataproducts Direct Access (DVFU) Direct Access (NVFU) Centronics Direct Access (CVFU)

Miscellaneous

Ribbon

Standard	Printronix P/N 102247

Carbon Black	P/N 102796 OCR
Fabric	Nylon, 1” X 60 yards spool−to−spool; Metal reverses on each end.

NOTE: Use only ribbons that meet the stated specifications.

Cleaning

Interval	3 months or 250 hours of operation
Kit	P/N 132009 includes a plastic cleaning nozzle, soft−bristled brush, and cleaning instructions.

Character Sets

ASCII Standard	Up to 229 characters Data Processing, Correspondence, High Speeds A, B, C	
International	**ECMA 94 Latin 1**	**IBM PC**
	ASCII (USA)	ASCII (USA)
	German	French
	Swedish	German
	Danish	English
	Norwegian	Danish
	Finnish	Swedish
	English	Italian
	Dutch	Spanish
	French	Japanese
	Spanish	French Canadian
	Italian	Latin Am
	Turkish	
	Japanese	
	Multinational	**DEC Multinational**
	ASCII	ASCII (USA)
	EBCDIC	French
		German
		English
		Norwegian/Danish
		Swedish
		Italian
		Spanish
		Japanese
		French Canadian
		Dutch
		Finnish
		Swiss

APPENDIX D

CONTROL CODE CROSS REFERENCE

The following lists provide the programming control codes alphabetically by function and alphabetically by code. In the Programming chapter, an alphabetical list of control code functions is presented by functional groups (format, paper motion, graphics, etc.).

> *NOTE: Some control code functions can be accomplished using another control code sequence or via control panel selection. SFCC refers to one of 5 different Special Function Control Code introducers available in the P−Series emulation mode; refer to the Programming chapter for details.*

Alphabetical By Function

Function	P−Series	Serial	Page
Backspace	BS	BS	6−7
Bell	BEL	BEL	6−8
Bit Image Mode, Double Density	N/A	ESC L	6−10
Bit Image Mode, Dbl Density Dbl Speed	N/A	ESC Y	6−11
Bit Image Mode, Quadruple Density	N/A	ESC Z	6−12
Bit Image Mode, Single Density	N/A	ESC K	6−9
Bold Print	SFCC G SFCC j	ESC G	6−13
Bold Print Reset	SFCC H	ESC H	6−14
Cancel	N/A	CAN	6−15
Carriage Return	CR	CR	6−16
Character Pitch 10 cpi	N/A	ESC P	6−17
Character Pitch 12 cpi	N/A	ESC M ESC :	6−18
Character Set Select	SFCC l	ESC l	6−19
Character Set Select (Control Codes)	SFCC 7	ESC 7	6−22
Character Set Select (Printable Symbols)	SFCC 6	ESC 6	6−23
Character Set Select (Printable Symbols)	N/A	ESC u	6−24
Character Set Select: International	SFCC R SFCC PSET	ESC R	6−25
Character Set Select: Extended (ECMA)	SFCC OSET	N/A	6−27
Condensed Print	N/A	SI ESC SI	6−28
Condensed Print Reset	N/A	DC2	6−29
Delete	N/A	DEL	6−30
Download a Character	SFCC c	ESC c	6−33
Download a Language	SFCC V	ESC V	6−31
Elongated (Double High) Print (1 line)	SFCC h BS	ESC h	6−34
Emphasized Print	SFCC E	ESC E	6−35

Alphabetical By Function (continued)

Function	P–Series	Serial	Page
Emphasized Print Reset	SFCC F	ESC F	6–36
Expanded (Double Wide) Print	SFCC W SFCC k	ESC W	6–37
Expanded (Double Wide) Print Reset	SFCC W	ESC W DC4	6–37
Expanded (Double Wide) Print (1 line)	SFCC k	SO ESC SO	6–38
Extended Character Set	SO SFCC SO SFCC n SFCC 4	ESC 4	6–39
Extended Character Set Cancel	SI SFCC SI SFCC o SFCC 5	ESC 5	6–40
Form Feed	FF	FF	6–41
Forms Length Set (Inches)	SFCC INCHES	ESC C NUL	6–42
Forms Length Set (Lines)	SFCC LINES	ESC C	6–43
Horizontal Tab	N/A	HT	6–44
Horizontal Tab Set	N/A	ESC D	6–45
Line Feed	LF	LF	6–46
Line Feed n/216 Inch (1 line only)	N/A	ESC J	6–47
Line Spacing 1/6 Inch (6 lpi)	SFCC 2 SFCC LPI	ESC 2	6–48
Line Spacing 1/8 Inch (8 lpi)	SFCC 0 SFCC LPI	ESC 0	6–49
Line Spacing 8 or 10.3 LPI (1 line only)	ACK SFCC f	N/A	6–50
Line Spacing 7/72 Inch	SFCC 1	ESC 1	6–51
Line Spacing n/72 Inch (as executed by ESC 2)	SFCC A	ESC A	6–52
Line Spacing n/216 Inch	SFCC 3	ESC 3	6–53
Overscoring	SFCC _	ESC _	6–54
Plot, Even Dot (High Density)	EOT SFCC d	N/A	6–55
Plot, Odd Dot (Normal Density)	ENQ SFCC e	N/A	6–56
Print Mode/Pitch Selection	SFCC X SFCC PMODE	ESC X	6–58
Printer Reset	SFCC @	ESC @	6–57
Printer Select	N/A	DC1	6–60
Printer Deselect	N/A	DC3	6–61
RibbonMinder, Enable/Disable	SFCC r	ESC r	6–62
RibbonMinder, Set Job Rate	SFCC r J	ESC r J	6–63
RibbonMinder, When Worn Action	SFCC r A	ESC r A	6–64
Skip–Over Perforation	N/A	ESC N	6–65
Skip–Over Perforation Cancel	N/A	ESC O	6–66

Alphabetical By Function (continued)

Function	P−Series	Serial	Page
Superscript/Subscript Printing	SFCC S	ESC S	6−67
Superscript/Subscript Printing Reset	SFCC T	ESC T	6−68
Underline	SFCC −	ESC −	6−69
VFU Commands (P−Series)	DLE−US	N/A	6−70
Vertical Tab	VT	VT	6−71
Vertical Tab Set/Clear (Serial Matrix)	N/A	ESC B	6−72

Alphabetical By P−Series Code

P−Series Code	Function	Page
ACK	Line Spacing 8 or 10.3 LPI (one line only)	6−50
BEL	Bell	6−8
BS	Backspace	6−7
BS	Elongated (Double High) Print (1 line only)	6−34
CR	Carriage Return	6−16
DLE−US	VFU Commands (P−Series)	6−70
ENQ	Plot, Odd Dot	6−56
EOT	Plot, Even Dot	6−55
FF	Form Feed	6−41
LF	Line Feed	6−46
SO	Extended Character Set	6−39
SI	Extended Character Set Cancel	6−40
SFCC @	Printer Reset	6−57
SFCC −	Underline	6−69
SFCC _	Overscoring	6−54
SFCC c	Download a Character	6−33
SFCC d	Plot, Even Dot (High Density)	6−55
SFCC e	Plot, Odd Dot (Normal Density)	6−56
SFCC f	Line Spacing 8 or 10.3 LPI (1 line only)	6−50
SFCC j	Bold Print	6−13
SFCC k	Expanded (Double Wide) Print (1 line only)	6−37
SFCC l	Character Set Select	6−19
SFCC n	Extended Character Set	6−39
SFCC o	Extended Character Set (Cancel)	6−40
SFCC r	RibbonMinder, Enable/Disable	6−62
SFCC r J	RibbonMinder, Set Job Rate	6−63
SFCC r A	RibbonMinder, When Worn Action	6−64
SFCC 0	Line Spacing 1/8 Inch (8 lpi)	6−49
SFCC 1	Line Spacing 7/72 Inch	6−51
SFCC 2	Line Spacing 1/6 Inch (6 lpi)	6−48
SFCC 3	Line Spacing n/216 Inch	6−53
SFCC 4	Extended Character Set Select	6−39
SFCC 5	Extended Character Set Cancel	6−40
SFCC 6	Character Set Select (Printable Symbols)	6−23

Alphabetical By P–Series Code (continued)

P–Series Code	Function	Page
SFCC 7	Character Set Select (Control Codes)	6–22
SFCC h	Elongated (Double High) Print	6–34
SFCC A	Line Spacing n/72 Inch (as executed by SFCC 2)	6–52
SFCC E	Emphasized Print	6–35
SFCC F	Emphasized Print Reset	6–36
SFCC G	Bold Print	6–13
SFCC H	Bold Print Reset	6–14
SFCC INCHES	Forms Length Set (Inches)	6–42
SFCC LINES	Forms Length Set (Lines)	6–43
SFCC LPI	Line Spacing 1/6 Inch (6 lpi) or 1/8 Inch (8 lpi)	6–48
SFCC LPI	Line Spacing 1/8 Inch (8 lpi)	6–46
SFCC OSET	Character Set Select: Extended (ECMA)	6–27
SFCC PMODE	Print Mode/Pitch Selection	6–58
SFCC PSET	Character Set Select: International	6–25
SFCC R	Character Set Select: International	6–25
SFCC S	Superscript/Subscript Printing	6–67
SFCC SO	Extended Character Set	6–39
SFCC SI	Extended Character Set Cancel	6–40
SFCC T	Superscript/Subscript Printing Reset	6–68
SFCC V	Download a Language	6–31
SFCC W	Expanded (Double Wide) Print and Reset	6–37
SFCC X	Print Mode/Pitch Selection	6–58
VT	Vertical Tab	6–71

Alphabetical By Serial Matrix Code

Serial Code	Function	Page
BEL	Bell	6–8
BS	Backspace	6–7
CAN	Cancel	6–15
CR	Carriage Return	6–16
DC1	Printer Select	6–60
DC2	Condensed Print Reset	6–29
DC3	Printer Deselect	6–61
DC4	Expanded (Double Wide) Print Reset	6–37
DEL	Delete	6–30
FF	Form Feed	6–41
HT	Horizontal Tab	6–44
LF	Line Feed	6–46
SI	Condensed Print	6–28
SO	Expanded (Double Wide) Print (1 line only)	6–38
ESC :	Character Pitch 12 cpi	6–18
ESC @	Printer Reset	6–57
ESC –	Underline	6–69
ESC _	Overscoring	6–54

Alphabetical By Serial Matrix Code (continued)

Serial Code	Function	Page
ESC 0	Line Spacing 1/8 Inch (8 lpi)	6−49
ESC 1	Line Spacing 7/72 Inch	6−51
ESC 2	Line Spacing 1/6 Inch (6 lpi)	6−48
ESC 2	Line Spacing n/72 Inch (as set by ESC A)	6−52
ESC 3	Line Spacing n/216 Inch	6−53
ESC 4	Extended Character Set	6−39
ESC 5	Extended Character Set Cancel	6−40
ESC 6	Character Set Select (Printable Symbols)	6−23
ESC 7	Character Set Select (Control Codes)	6−22
ESC c	Download a Character	6−33
ESC h	Elongated (Double High) Print (1 line only)	6−34
ESC l	Character Set Select	6−19
ESC r	RibbonMinder, Enable/Disable	6−62
ESC r J	RibbonMinder, Set Job Rate	6−63
ESC r A	RibbonMinder, When Worn Action	6−64
ESC u	Character Set Select (Printable Symbols)	6−24
ESC A	Line Spacing n/72 Inch (as executed by ESC 2)	6−52
ESC B	Vertical Tab Set/Clear (Serial Matrix)	6−72
ESC C	Forms Length Set (Lines)	6−43
ESC C NUL	Forms Length Set (Inches)	6−42
ESC D	Horizontal Tab Set	6−45
ESC E	Emphasized Print	6−35
ESC F	Emphasized Print Reset	6−36
ESC G	Bold Print	6−13
ESC H	Bold Print Reset	6−14
ESC J	Line Feed n/216 Inch (1 line only)	6−47
ESC K	Bit Image Mode, Single Density	6−9
ESC L	Bit Image Mode, Double Density	6−10
ESC M	Character Pitch 12 cpi	6−18
ESC N	Skip−Over Perforation	6−65
ESC O	Skip−Over Perforation Cancel	6−66
ESC P	Character Pitch 10 cpi	6−17
ESC R	Character Set Select: International	6−25
ESC S	Superscript/Subscript Printing	6−67
ESC SI	Condensed Print	6−28
ESC SO	Expanded (Double Wide) Print (1 line only)	6−38
ESC T	Superscript/Subscript Printing Reset	6−68
ESC V	Download a Language	6−31
ESC W	Expanded (Double Wide) Print	6−37
ESC X	Print Mode/Pitch Selection	6−58
ESC Y	Bit Image Mode, Dbl Density, Dbl Speed	6−11
ESC Z	Bit Image Mode, Quadruple Density	6−12
VT	Vertical Tab	6−71

APPENDIX E

DOWNLOADING CHARACTERS

Introduction

P9012 printers include the ability to create and download unique characters from the host computer to the printer's working memory (RAM). Downloaded characters must be reloaded each time printer power is recycled or RAM is cleared unless they are saved into nonvolatile memory.

Three commands are involved in downloading a character:

1. **SFCC c** − defining the new character in a specific print mode and pitch.
2. **SFCC V** − (Download a Language) if the new character is to be stored in a currently *unused* address in the Character Library.
3. **SFCC RX** − (Character Set Select: International Languages) when ready to access the downloaded character.

Procedure

NOTE: Each parameter is visually separated by paired brace symbols for clarity in distinguishing parameters. Do not input these brace pairs in the command sequence.

The command **SFCC c** is followed by ASCII characters: **{PP}{SSSSSE}{A};{data}**

where:

{PP} is the print mode and pitch at which the downloaded character will print (derived from the **mn** values in Print Mode/Pitch Selection Table 6−7 on page 6−59).

{SSSSSE} is the decimal value between 0 and 65535 representing the symbol point of the new character in the Character Library; **E** is the terminator following this numeric field. No leading zeros are required.

A character can be stored in an unused address or replace an existing character in the Character Library. If designated to an unused address, you must use this control code in conjunction with SFCC V (Downloading a Language, page 6−31) to complete the downloading procedure. **However, if a downloaded character replaces an existing character in a print mode and pitch, that character will be changed in every character set or international language in which that existing character was used.**

{A}; is the single−character attribute flag identifying whether the character contains descenders (a portion of the character descends below the bottom of the print line) or extenders (2 dot rows near the bottom of the character are repeated until what would be the next line boundary at 6 lpi). Extenders are used for graphics characters. **0** = no attributes; **2** = descenders; and **6** = extended characters. The semicolon (**;**) is the hexadecimal data terminator.

{data} are the data values for *each* dot column of the character cell. The Least Significant Bit is the bottom−most dot of the character. The size of the character cell is determined by the selected print mode and pitch {**PP**} and the attributes {**A**} applied to it. If there is not enough data to define each dot column in the character cell, any subsequent bytes will be used to complete the dot column data; if more data is sent than expected, the excess data will be treated as printable data. The character size is determined using the data in Table E−2. The semicolon (;) is the hexadecimal data terminator and must follow each dot column entry.

Depending on the memory requirements for each character, six or more characters can be created. When memory to store downloaded characters has been exhausted, the printer will beep and display DOWNLOAD CHAR. MEMORY FULL for one second; characters downloaded after this point will not be saved. Downloaded characters can be saved into printer powerup configuration when the configuration is saved. User−defined characters have priority over standard *Printronix* characters.

The largest permitted symbol point is 65,535 decimal; values greater than 65,535 are invalid. Non−numeric characters in a numeric data field will also render the character invalid. If the defined character format is invalid, all downloaded characters in working memory are cleared. (Characters saved in nonvolatile memory are not affected.)

The Extend attribute causes the character to be extended to what would be the next line boundary at 6 LPI. This attribute is useful for graphics characters that need to be connected with graphics characters on the next line. The Extend attribute is achieved by repeating the lowest−most two dot rows. Characters with the Extend attribute are assumed to be characters with descenders. Table E−1 below shows by print mode the number of dot rows and the number of times the dot rows are repeated when the Extend attribute is used.

Table E−1. Extended Character Attributes

Print Mode	# of Dot Rows	# of Times Repeated
DP	2	1.5
NLQ	2	2
HS	2	1
HSB	2	2.5
HSC	2	2
OCR−A	N/A	N/A
OCR−B	N/A	N/A

Table E−2. Calculating the Character Size

Print Mode and Pitch	Print/Pitch Code*	Dots per Inch (dpi)	Bits Per Dot Column		Number of Dot Columns
			no descenders	*with descenders*	
DP10	00	120	7	† 9	12
DP12	01	120	7	† 9	10
DP13	02	120	7	† 9	9
DP15	03	120	7	† 9	8
DP17	04	120	7	† 9	7
NLQ10	10	180	9	12	18
NLQ12	11	180	9	12	15
NLQ15	13	180	9	12	12
HS10	20	120	5	6	12
HS12	21	120	5	6	10
HS13	22	120	5	6	9
HS15	23	120	5	6	8
HS17	24	120	5	6	7
HSB10	30	120	6	7	12
HSB12	31	120	6	7	10
HSB13	32	120	6	7	9
HSB15	33	120	6	7	8
HSB17	34	120	6	7	7
HSC10	40	120	7	8	12
HSC12	41	120	7	8	10
HSC13	42	120	7	8	9
HSC15	43	120	7	8	8
HSC17	44	120	7	8	7
OCR−A	50	120	14	16	12
OCR−B	60	120	14	16	12

**Print/Pitch Code is derived from the mn values in Table 6−7 on page 6−59.*
†8 bits are actually used for descenders; the 9th bit is assumed to be zero.

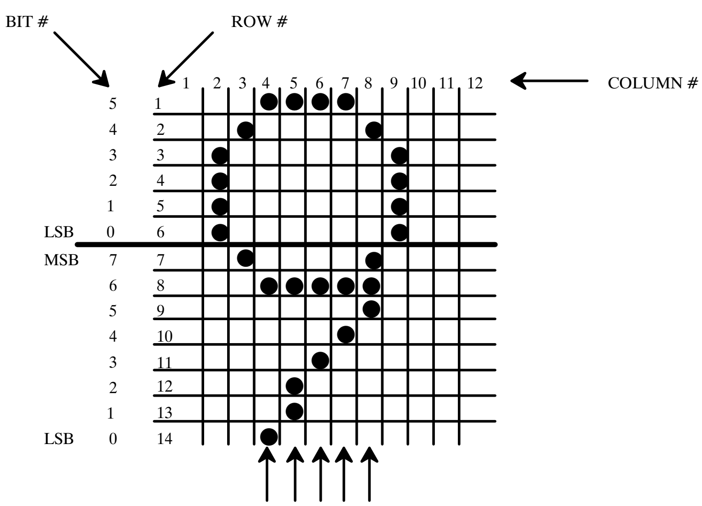
Examples

The following examples illustrate the process of creating three characters: one with no attributes, one with descenders, and one with extenders.

NOTE: If adjacent dots are used to create the character, the printer will set an adjacent dot flag, and any line containing the character may print at half the normal speed. Half speed may also result if a dot is placed in the first or last dot column of the character cell.

Example 1: Characters with No Attributes

NOTE: This example illustrates how OCR characters could be produced using the downloading feature should an OCR reader fail to read standard OCR printed characters.



Column	Value
1	0000
2	0F00
3	1080
4	2041
5	2046
6	2048
7	2030
8	10E0
9	0F00
10	0000
11	0000
12	0000

Adjacent dots in rows 1 and 8 may result in half−speed printing of those dot rows.

Selected Print Mode and Pitch: OCR−B 10 cpi
OCR−B 10 cpi with no attributes = 12 Columns x 14 bits per column (Table E−2)

Figure E−1. Characters with no Attributes Layout

The BASIC program to generate this character and a print sample is provided below.

```
10 LPRINT CHR$(27);"@";
20 LPRINT CHR$(27);"c6057E0;0;";
30 LPRINT "F00;1080;2041;2046;2048;2050;10E0;F00;0;0;0;";
40 LPRINT CHR$(27);"X60";
50 LPRINT "99999"
```

The command for the character shown in Figure E−1 is defined as follows:

ESC c {60}{57E}{0};{0;F00;1080;2041;2046;2048;2050;10E0;F00;0;0;0;}

99999

where:

ESC c is the Serial Matrix Control Code Header introducing the Download a Character command.

{**60**} is the selected print mode and pitch code from Table E−2 derived from Print Mode/Pitch Selection Table 6−7 on page 6−59 (where **m** = 6 representing OCR mode; and **n** = 0 representing a pitch of 10 cpi.)

{**57E**} is the address location in the Character Library where the downloaded character will be sent. **E** is the decimal field terminator (required after *each* decimal field). Address 57 contains an existing character which will be replaced by the new character.

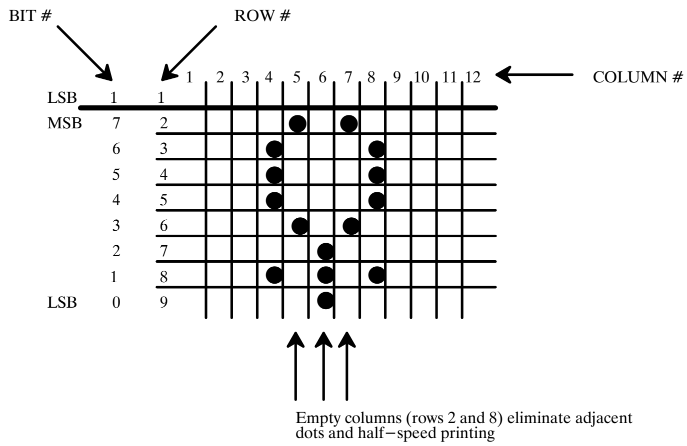
❑ IMPORTANT ❑

If a downloaded character replaces an existing character in a print mode and pitch, that character will be changed in <u>every</u> character set or international language in which that existing character was used.

{**0**}**;** is the single−character attributes flag identifying the character with no attributes (descenders or extenders). The semicolon (;) is the hexadecimal data terminator.

{0;F00;1080;2041;2046;2048;2050;10E0;F00;0;0;0;}
is the ASCII data generated from each column of the character layout in Figure E−1.

Example 2: Characters with Descenders



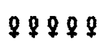
Column	Value
1	0000
2	0000
3	0000
4	0072
5	0088
6	0007
7	0088
8	0072
9	0000
10	0000
11	0000
12	0000

Selected Print Mode and Pitch: DP 10 cpi
DP 10 cpi with descenders = 12 Columns x 9 bits per column (Table E−2)

Figure E−2. Characters with Descenders Layout

The BASIC program to generate this character and a print sample is provided below.

```
10 WIDTH "LPT1:",255
20 LPRINT CHR$(27);"@";
30 LPRINT CHR$(27);"c0090E2;0;0;0;72;88;7;88;72;0;0;0;0;";
40 LPRINT CHR$(27);"X00";
50 LPRINT "ZZZZZ"
```



The command for the character shown in Figure E−2 is as follows:

ESC c {00}{90E}{2};{0;0;0;72;88;7;88;72;0;0;0;0;}

where:

ESC c is the Serial Matrix Control Code Header introducing the Download a Character command.

{**00**} is the selected print mode and pitch code from Table E−2 derived from Print Mode/Pitch Selection Table 6−7 on page 6−59 **m** = 0 representing DP mode; and **n** = 0 representing a pitch of 10 cpi.)

{**90E**} is the address location in the Character Library where the downloaded character will be sent. The existing character at address 90 will be replaced with the new character. **E** is the decimal field terminator (required after *each* decimal field).

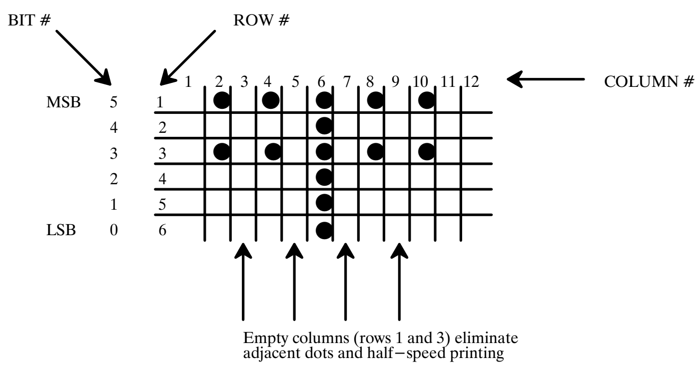
❑ IMPORTANT ❑

If a downloaded character replaces an existing character in a print mode and pitch, that character will be changed in every character set or international language in which that existing character was used.

{**2**}**;** is the single−character attributes flag identifying the character with descenders. The semicolon (;) is the hexadecimal data terminator.

{0;0;0;72;88;7;88;72;0;0;0;0;}
is the ASCII data generated from each column of the character layout in Figure E−2.

Example 3: Characters with Extenders



Column	Value
1	0000
2	0028
3	0000
4	0028
5	0000
6	003F
7	0000
8	0028
9	0000
10	0028
11	0000
12	0000

Selected Print Mode and Pitch: HS 10 cpi
HS 10 cpi with extenders = 12 Columns x 6 bits per column (Table E−2)

Figure E−3. Characters with Extenders Layout

The BASIC program to generate this character and a print sample is provided below.

```
10 WIDTH "LPT1:",255
20 LPRINT CHR$(27);"@";
30 LPRINT CHR$(27);"c201010E6;0;28;0;28;0;3F;0;28;0;28;0;0;";
40 LPRINT CHR$(27);"V1E66E1010E";
50 LPRINT CHR$(27);"RX";
60 LPRINT CHR$(27);"X20";
70 LPRINT "BBBBB"
```

The command for the character shown in Figure E−3 is as follows:

ESC c {20}{1010E}{6};{0;8;0;8;0;F;0;8;0;8;0;0;}

where:

ESC c is the Serial Matrix Control Code Header introducing the Download a character command.

{**20**} is the selected print mode and pitch code from Table E−2 derived from Print Mode/Pitch Selection Table 6−7 on page 6−59 **m** = 2 representing HS mode; and **n** = 0 representing a pitch of 10 cpi.)

{**1010E**} is the address location in the Character Library where the downloaded character will be sent. Address 1010 is an unused address. **E** is the decimal field terminator (required after *each* decimal field).

❑ IMPORTANT ❑

If a downloaded character replaces an existing character in a print mode and pitch, that character will be changed in every character set or international language in which that existing character was used.

{**6**}**;** is the single−character attributes flag identifying the character with extenders. The semicolon (;) is the hexadecimal data terminator.

{0;8;0;8;0;F;0;8;0;8;0;0;}
is the ASCII data generated from each column of the character layout in Figure E−2.

APPENDIX F

HARDWARE JUMPER CONFIGURATION

Jumpers on the DCU (Data Control Unit) board are used to select a few configuration parameters. These jumpers are installed for normal operation at the factory. However, certain applications may require a modification to the jumper configuration. To change any of these configuration jumpers, the DCU logic board must be removed. Table F−1 describes the jumper configurations. To gain access to the DCU Printed Circuit Board Assembly (PCBA), the right side panel and the card cage access panel must be removed as described in the following procedures.

❑ CAUTION ❑

Some configurations require cutting an etch and soldering on the PCBA. These changes should only be performed by a trained technician.

❑ VORSICHT ❑

Manche Konfigurationen benötigen einen Ätzschnitt und Löten am PCBA. Diese Änderungen sollten nur von einem geschulten Techniker vorgenommen werden.

Table F−1. Hardware Jumper Configuration

Jumper Description	Description
E1A−E1B	Print Head Select 0
E2A−E2B	Print Head Select 1
E3A−E3B	RXCLK Input
E3B−E3C	Clock to 68901 RC Input
E4A−E4B	TXCLK Input
E4B−E4C	Timer C Output to Clock
E5A−E5B	NTXCLK Input
E5B−E5C	Clock to 68901 TC Input
E6A−E6B	Clock DPMC Phase 1
E6B−E6C	Clock DPMC Phase 2*
E7A−E7B	Clock CPU*
	*Normal Installed Jumpers

**NOTE: Only one of the Serial Interface clocks can be selected by inserting the related jumper. Selecting one of these clocks will require cutting the appropriate etch on the PCBA: For jumper E4A−E4B, cut E4B−E4C; for jumper E5A−E5B, cut E5B−E5C; for jumper E6A−E6B, cut E6B−E6C. These changes should only be performed by a qualified technician.*

Side Panel Removal

To remove the right side panel to access the card cage, perform the following instructions and refer to Figure F−1.

1. Disconnect the AC power source.
2. Raise the printer cover.
3. Loosen (but do not remove) the captive screws (A), one at a time, from the upper corners of the side panel (B) until the side panel pulls away from the cabinet.
4. Using both hands, lift the side panel up and off the mounting studs (C) at the bottom of the printer side panel.

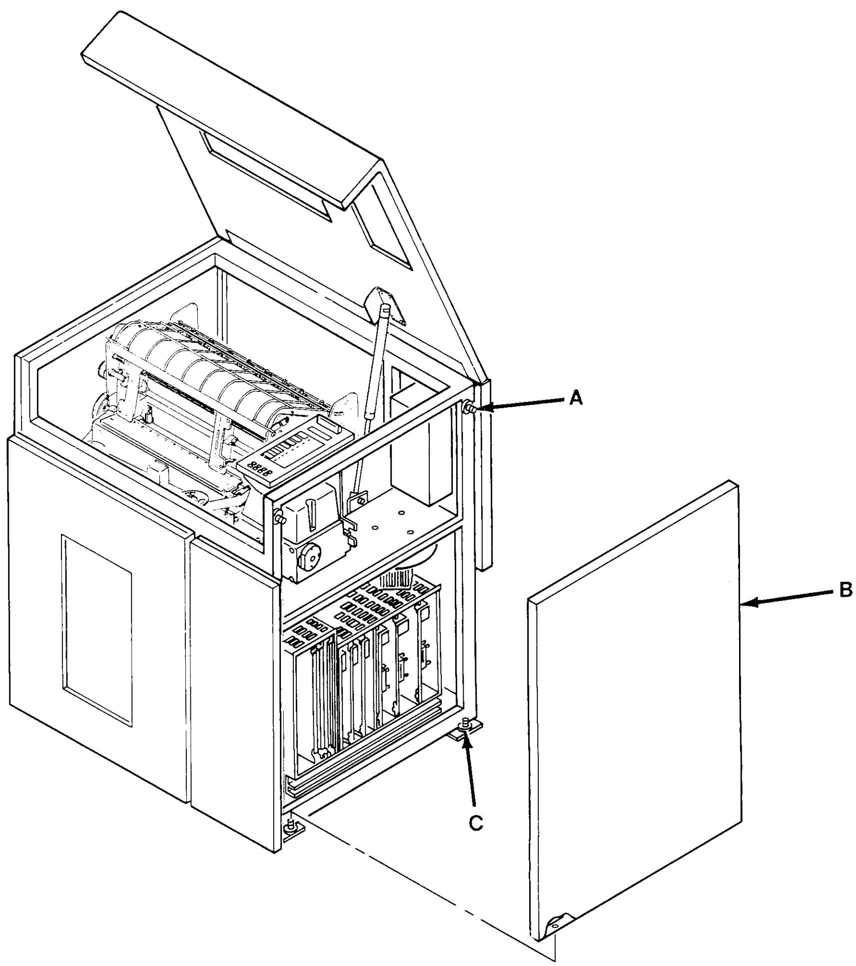


Figure F−1. Side Panel Removal

Removing the DCU PCBA

After removing the side panel, the card cage can be accessed. To remove the DCU PCBA from the card cage, perform the following instructions and refer to Figure F−2.

1. To remove the card cage access panel (A), loosen (but do not remove) the two hex head screws (B) on the bottom of the card cage and lift the panel up and off.
2. Locate the DCU PCBA (C); the names of the PCBAs are printed on the card cage.
3. Snap out the top and bottom ejector levers (D) to release the PCBA from the edge connector.
4. Gently slide the PCBA out of the card cage.
5. Make or verify the required jumper configuration change(s) (Table F−1).
6. Align the PCBA with its slot and gently slide it back into the card cage.
7. Press the ejection levers gently into position to secure the PCBA into the back−plane edge connectors.

❏ CAUTION ❏

Never force the PCBA into position. Forcing a PCBA into position can damage components or break the PCBA. Realign and reinstall the PCBA if it does not smoothly slide into position.

❏ VORSICHT ❏

Keine Gewalt beim Einsetzen der Platine anwenden. Gewaltanwendung kann Bauteile zerstören oder den Bruch der Platine bewirken. Falls erforderlich Platine herausziehen und erneut einsetzen.

8. Slide the card cage access panel down into position; secure it by tightening the two hex head screws on the bottom of the card cage.
9. Replace the side panel on the mounting studs.
10. Install the two screws and washers securing the side panel at each top corner.
11. Close the printer cover.
12. Connect the AC power source.

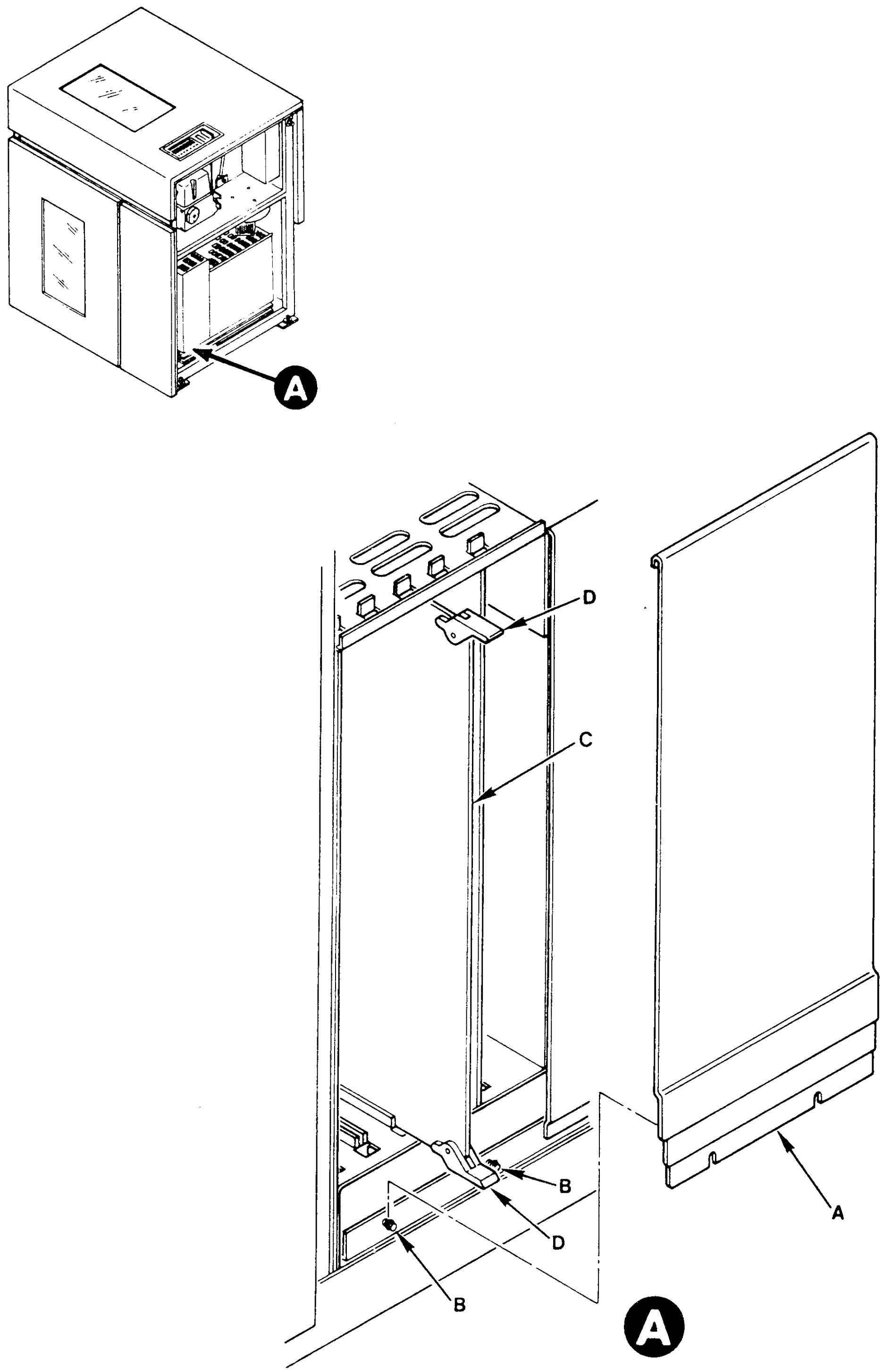


Figure F−2. Removing the DCU PCBA

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